

PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XLIX—No. 5



May, 1923

Published by the American Society of Civil Engineers at its Headquarters,
33 West Thirty-ninth Street, New York, January-May, August-December,
Printed in the United States.

Copyrighted 1923, by the American Society of Civil Engineers.
Entered as Second-Class Matter, December 14th, 1896, at the Post Office
at New York, N. Y., under the Act of March 3d, 1879.
Acceptance for mailing at special rate of postage provided for in Section 1103,
Act of October 3d, 1917, authorized on July 5th, 1918.
Subscription, \$5 per annum.

SUMMARY OF CONTENTS

This publication is divided into three parts, Society Affairs, Preliminary Notices of Applications for Admission and for Transfer, and Reports, Papers, Discussions and Memoirs. These have separate pagings.

For complete Table of Contents see:

Society Affairs.....	Page 283
Preliminary Notices of Applications.....	" 127
Reports, Papers, Discussions, and Memoirs.....	" 823

PAPERS IN THIS NUMBER

- "Theoretical Frequency Curves and Their Application." H. ALDEN FOSTER.
- "The Design of Earth Dams." JOEL D. JUSTIN. (To be Presented May 2, 1923.)
- "The Water Power Problem:" A Symposium.

CURRENT PAPERS AND DISCUSSIONS

		Discussion closes,
"Tentative Plan for the Construction of a 780-Foot Rock-Fill Dam on the Colorado River at Lees Ferry, Arizona." E. C. LA RUE.....	Apr., 1922	
Discussion (Author's Closure).....	Sept., Oct., Dec., 1922, May, 1923	Closed
"Locomotive Loadings for Railway Bridges." D. B. STEINMAN.....	May, 1922	
Discussion (Author's Closure).....	Oct., Nov., Dec., 1922, Jan., May, 1923	Closed
Technical Papers Presented at the Annual Convention at Portsmouth, N. H., June 21, 1922.....	Aug., Sept., 1922	
Discussion.....	Aug., Nov., 1922, Jan., 1923	Uncertain
"The Water Power Problem".....	Nov., Dec., 1922, May, 1923	
Discussion.....	Dec., 1922, Jan., Feb., Mar., Apr., May, 1923	Uncertain
"Analysis of Cost of Freight Service, Grand Trunk Railway Company of Canada." J. P. NEWELL.....	Jan., 1923	
Discussion.....	May, 1923	Closed
"The Design of Structural Supports for Turbo-Generators." EDWARD H. CAMERON.....	Jan., 1923	
Discussion (Author's Closure).....	Feb., Mar., Apr., May, 1923	Closed
"Reinforced Concrete Columns." JOHN TUCKER, JR.....	Feb., 1923	
Discussion.....	Apr., May, 1923	May, 1923
Third Progress Report of the Special Committee on Stresses in Railroad Track.....	Mar., 1923	Uncertain
Progress Report of the Special Committee on Impact in Highway Bridges.....	Mar., 1923	Uncertain
Progress Report of the Special Committee on Electrification of Steam Railways.....	Mar., 1923	Uncertain
Technical Papers Presented at the Annual Meeting, January 17th and 19th, 1923.....	Mar., 1923	
Discussion.....	Apr., May, 1923	Uncertain
"Lateral Earth Pressure: The Accurate Experimental Determination of the Lateral Earth Pressure, Together with a Resume of Previous Experiments." JACOB FELD.....	Apr., 1923	
Discussion.....	May, 1923	Aug., 1923
"Elastic Stresses in Rock Surrounding Pressure Tunnels." CHARLES P. DUNN.....	Apr., 1923	Aug., 1923
"A River Diversion on the Delta of the Colorado in Relation to Imperial Valley, California." S. L. ROTHERY.....	Apr., 1923	Aug., 1923

PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XLIX—No. 5.

MAY, 1923

Edited by the Secretary, under the direction of the Committee on
Technical Activities and Publications.

Reprints from this publication, which is copyrighted, may be made on condition that the full
title of Paper, name of Author, page reference, and date of
presentation to the Society, are given.

This Society is not responsible for any statement made or opinion expressed
in its publications.

NEW YORK 1923

Entered according to Act of Congress, in the year 1923, by the AMERICAN SOCIETY OF CIVIL
ENGINEERS, in the office of the Librarian of Congress, at Washington.

American Society of Civil Engineers

OFFICERS FOR 1923

President, CHARLES F. LOWETH

Vice-Presidents

Term expires January, 1924:

C. E. GRUNSKY
ROBERT RIDGWAY

Term expires January, 1925:

GEORGE S. DAVISON
ANSON MARSTON

Secretary, JOHN H. DUNLAP

Assistant Secretary, C. E. BEAM

Treasurer, OTIS E. HOVEY

Directors

Term expires January, 1924:

RICHARD L. HUMPHREY
BAXTER L. BROWN
JOHN P. HOGAN
IRA W. MCCONNELL
GEORGE G. ANDERSON
FRANK T. DARROW

Term expires January, 1925:

JOHN N. CHESTER
ARTHUR J. DYER
FRANK E. WINSOR
WALTER L. HUBER
JOSEPH J. YATES
CLIFFORD M. HOLLAND

Term expires January, 1926:

GEORGE C. MASON
THEODORE L. CONDRON
GEORGE H. FENKELL
GLENN D. HOLMES
EZRA B. WHITMAN
RALPH N. BEGLEN

Past-Presidents, Members of the Board:

ARTHUR N. TALBOT

F. S. CURTIS
ARTHUR P. DAVIS

GEORGE S. WEBSTER
JOHN R. FREEMAN

Secretary Emeritus, CHARLES WARREN HUNT

Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex officio* MEMBER OF ALL COMMITTEES)

EXECUTIVE COMMITTEE: Charles F. Loweth, Robert Ridgway, Clifford M. Holland, George S. Webster, Frank E. Winsor.

ON TECHNICAL ACTIVITIES AND PUBLICATIONS: Richard L. Humphrey, John N. Chester, C. E. Grunsky, John P. Hogan, J. J. Yates.

ON PUBLIC RELATIONS: Baxter L. Brown, M. G. Barnes, A. H. Markwart, Leonard Metcalf, George R. Putnam.

ON SPECIAL COMMITTEES: (Not yet appointed).

ON HONORARY MEMBERSHIP: A. N. Talbot, F. S. Curtis, Arthur P. Davis, George S. Davison, John R. Freeman, C. E. Grunsky, Charles F. Loweth, Anson Marston, Robert Ridgway, George S. Webster.

ON LOCAL SECTIONS: Richard L. Humphrey, George G. Anderson, George H. Fenkell.

ON PROFESSIONAL CONDUCT: John R. Freeman, George S. Davison, I. W. McConnell.

ON STUDENT CHAPTERS: Anson Marston, Arthur J. Dyer, E. B. Whitman.

Special Committees

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Walter J. Douglas, E. G. Haines, Allen Hazen, James C. Meem, George Paaswell.

ON STRESSES IN RAILROAD TRACK: A. N. Talbot, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, W. M. Dawley, H. E. Hale, Robert W. Hunt, J. B. Jenkins, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, G. J. Ray, Albert F. Reichmann, H. R. Safford, Earl Stimson, F. E. Turneure, J. E. Willoughby.

ON HIGHWAY ENGINEERING: H. Eltinge Breed, George W. Tillson, A. R. Fletcher, John M. Goodell.

ON BRIDGE DESIGN AND CONSTRUCTION: Henry B. Seaman, J. H. Ames, Victor H. Cochran, J. E. Greiner, C. R. Harding, Otis E. Hovey, C. W. Hudson, E. F. Kelley, M. S. Ketchum, S. B. Slack, I. F. Stern, F. E. Turneure.

ON CONTRACT STANDARD CLAUSES: J. S. Langthorn, H. Eltinge Breed, J. H. Brillhart, Edward H. Lee, Hunter McDonald, George H. Pegram, Henry H. Quimby.

ON INDUSTRIAL EDUCATION: Herman Schneider, E. J. Mehren, Leonard S. Smith.

ON ELECTRIFICATION OF STEAM RAILWAYS: Charles F. Loweth, Blon J. Arnold, George Gibbs, George W. Kittredge, E. J. Pearson, Samuel Rea, Robert Ridgway.

ON STRESSES IN STRUCTURAL STEEL: F. O. Dufour, Clement E. Chase, O. F. Dalstrom, J. H. Edwards, R. J. Fogg, F. W. Masters, L. D. Rights, F. E. Schmitt, W. J. Thomas.

ON IMPACT IN HIGHWAY BRIDGES: A. H. Fuller, A. R. Eitzen, E. F. Kelley, C. T. Morris, F. E. Turneure.

ON FLOOD-PROTECTION DATA: N. C. Grover, C. B. Burdick, W. P. Creager, H. P. Eddy, Gerard H. Matthes, Charles H. Paul, A. O. Ridgway.

ON IRRIGATION HYDRAULICS: D. C. Henny, W. F. Allison, B. A. Etcheverry, Samuel Fortler, R. L. Parshall, J. L. Savage, F. C. Scobey, Stuart Sims, J. C. Stevens, Franklin Thomas.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Items of Interest.....	283
Activities of Local Sections.....	288
Minutes of Meetings:	
Organization Meetings of Technical Divisions.....	299
Of the Special Committee on Stresses in Structural Steel, January 31, and March 14, 1923..	304
Of the Special Committee on Stresses in Railroad Track, March 13, 1923.....	306
Announcements:	
Hours during which the Reading Room is open.....	307
Future Meetings.....	307
Annual Convention.....	307
Searches in the Library.....	307
Membership (Additions, Resignations, Deaths).....	308
Employment Bulletin.....	312
Additions to Engineering Societies' Library.....	316
Current Engineering Literature.....	324

Items of Interest*

Report of Tellers Appointed to Canvass the Ballots on Joining the Federated American Engineering Societies

NEW YORK, April 6, 1923.

The Tellers appointed to canvass the Ballot on Joining the Federated American Engineering Societies report as follows:

Total number of ballots received..... 5 947

Excluded ballots:

From members in arrears of dues.....	88
Without signature.....	51
From members other than Corporate Members.....	9
With identification other than written signature.....	34
From member deceased since voting.....	1
Void	11
Total ballots counted.....	5 753

Results by Geographical Districts 1922

District No.	Yes.	No.
1.—Foreign	25	84
1.—Resident.....	166	688
2.— "	84	331
3.— "	107	211
4.— "	143	292
5.— "	134	254
6.— "	87	214
Carried forward.....	746	2 074

* Members are urged to contribute items of general interest.

District.	Yes.	No.
<i>Brought forward</i>	746	2 074
7.— “	276	144
8.— “	167	186
9.— “	184	154
10.— “	109	203
11.— “	191	189
12.— “	102	124
13.— “	84	209
14.— “	108	158
15.— “	145	200
	<hr/> 2 112	<hr/> 3 641

Respectfully submitted

ORRIN L. BRODIE, *Chairman,*

O. F. BELLOWES,
RENÉ L. BERTIN,
C. S. BILYEU,
L. L. CALVERT,
WM. H. CHORLTON,
CHARLES GILMAN,
CHARLES S. GLEIM

A. B. HAGER,
THEODORE R. KENDALL,
MILES I. KILLMER,
J. H. LIBBERTON,
R. S. MOORE,
L. R. SHELLENBERGER,
F. A. SNYDER,

Tellers.

Secretary Hughes Pays Tribute to the Work of John F. Stevens

John F. Stevens, Hon. M. Am. Soc. C. E., who has returned to the United States after assisting in the operation and improvement of railways in Russia and Manchuria for nearly six years has been complimented publicly by Secretary of State Hughes, as follows:

“I wish to take this occasion to assure you of the high regard in which your work as President of the Interallied Technical Board and as the American representative thereon is held by the President as well as by myself and the other members of the Government.

“It is recalled that soon after the United States entered the war you proceeded to Russia at the request of President Wilson and with the knowledge and approval of the Provisional Government of Russia, as the head of a commission of American railway experts, and that, after this commission had completed a study of the Russian railways and made helpful recommendations to the Russian railway authorities, you were invited to remain with the Russian Ministry of Ways of Communication in the capacity of a special adviser and with a view to carrying into actual operation the measures which the commission had agreed upon with the Russian officials. It is recalled also that the Russian Railway Service Corps, consisting of American railway men who undertook as a war service to assist in the operation and improvement of the Russian railways, was organized at your inspiration and that the admirable work subsequently accomplished by this corps was developed under your direction.

“As the logical result of these activities you were invited in 1919 by this Government, as well as the Government of Japan and the other Governments concerned, to become President of the Interallied Technical Board, which was charged with the general supervision and management of the railways in the portions of Siberia in which allied forces were then operating. During the three and a half years of the existence of this board much was accomplished, in the face of the most extraordinary difficulties, to preserve railway

lines which are vital to the economic life of Siberia and to keep them in operation despite public disorder and general disorganization.

"I am glad to hear of your appreciation of the support which you received in this work from your colleagues on the Technical Board, representing seven other nations, and the cordial relations which existed among you throughout the time of your arduous service. I shall take pleasure in communicating on this subject with the Governments concerned.

"Your own leading part in this work constitutes a public service of the highest order. I feel that you have contributed much to the well-being of the people of Eastern Siberia and Manchuria and to the early recuperation of their economic life and that you have advanced the prestige and honor of the United States in that part of the world and with all who have known of your work.

"Your own expressions of appreciation of the excellent work done by your technical and clerical subordinates have been noted, and I hope that you will make known to them the value which this Government attaches to the work which they have done and its high appreciation of the spirit of their service."

Technical Divisions of the Society

Technical Divisions in Power, Sanitary Engineering, Irrigation Engineering, and Highway Engineering were organized during the week of the Annual Meeting of the Society in January, 1923.

A brief account of all the meetings and the By-Laws of the Sanitary, Irrigation, and Highway Engineering, and Power Divisions are published under Minutes of Meetings* in this number of *Proceedings*.

Technical Divisions may be organized for the consideration of any engineering, scientific, or professional subject upon the written request of not less than twenty members of the Society. Requests for enrollment in any one or more of the Technical Divisions should be addressed to the Secretary.

Meetings of Special Committees of the Society

The attention of members is called to the minutes of meetings of the Special Committee on Stresses in Structural Steel and the Special Committee on Stresses in Railroad Track, as published in this number of *Proceedings*.†

Attention is also directed to the reports of Special Committees that were presented to the Annual Meeting on January 17, 1923, and published in *Proceedings* for March, 1923.‡ These reports include that of the Special Committee on Stresses in Railroad Track, which is the Third Progress Report to be published by the Society in that field of research, the First Progress Report of the Special Committee on Impact in Highway Bridges which was appointed in August, 1922, and the First Progress Report of the Special Committee on the Electrification of Steam Railways.

Activities of Student Chapters

CARNEGIE INSTITUTE OF TECHNOLOGY

College credits are being given for attendance at the meetings of the Student Chapter of the Society at the Carnegie Institute of Technology.

* See p. 299.

† See p. 304.

‡ In Papers and Discussions, p. 295, *et seq.*

The meetings are held for one hour each week for Sophomore, Junior, and Senior students in Civil Engineering. About half the meetings consist of addresses on civil engineering or related topics by prominent engineers of the Pittsburgh District. The other meetings are devoted to papers by the students. Each Senior, assisted by three Juniors and Sophomores, presents a paper on some phase of civil engineering work, the Senior having complete charge of the program of the meeting. The students are not permitted to read their manuscripts, but are expected to speak from notes.

The plan described has been in operation for three years.

OREGON AGRICULTURAL COLLEGE

The students of the Department of Civil Engineering of Oregon Agricultural College have presented papers on the following subjects before recent meetings of the Student Chapter at that college: "The Hetch Hetchy Water Supply Project", by E. W. Paddock; "Outline of the Alaska Railroad", by George Laird; "The Miami Valley and the 1913 Flood", by George Linton; and "The Rock Creek Bridge Fill", by Chris. M. Lindberg.

Three prizes are awarded annually by the Portland (Ore.) Section for the three best papers on engineering subjects presented by members of the Senior Class of the Oregon Agricultural College who are members of the Student Chapter at that College.

1923 Year Book of the American Engineering Standards Committee

The 1923 Year Book of the American Engineering Standards Committee shows that great progress has been made during the last year in standardization projects affecting mechanical and the metal industries.

Two hundred and seventy-five National bodies, technical, industrial and governmental, are now co-operating in the work of the Standards Committee through officially accredited representatives, and more than 900 individuals are serving on the Sectional Committees, which carry on the actual standardization work, the American Engineering Standards Committee acting only as an administrative body.

One of the most important accomplishments of the year was the development of a plan of co-operation between the Federal Specifications Board, the body which develops the specifications for all Government purchases, and the American Engineering Standards Committee, by which the specifications of the Board are submitted informally to the Standards Committee before definite adoption. Through this plan, the Government received the criticisms of industry through the organizations which speak for those branches of industry that are concerned with any particular standard.

A copy of the 1923 Year Book has been placed in the Reading Room of the Society for the use of members. Those desiring copies of this book should address inquiries to American Engineering Standards Committee, 29 West 39th Street, New York City.

Asiatic Markets for Industrial Machinery

The Industrial Machinery Division of the U. S. Department of Commerce has issued a report of more than 300 pages which deals with the conditions for industrial machinery in India, Ceylon, and the countries of the Far East. A copy of the report has been placed on file in the Reading Room of the Society for the use of members who may be interested. Separate copies of the report may be obtained from the Superintendent of Documents, Washington, D. C., at 60 cents per copy.

Activities of Local Sections*

Meeting of the San Francisco Section

A regular meeting of the San Francisco Section was called to order at the Engineers' Club, on February 20, 1923; President G. A. M. Elliott in the chair; Henry D. Dewell, Secretary; and present, also, 87 members and guests.

The meeting was preceded by a dinner at which Myron S. Falk, M. Am. Soc. C. E., and Maj. J. H. Burns, Ordnance Department, U. S. A., were the guests of the Section.

President Elliott presented a letter from Secretary Dunlap of the Society in which it was stated that the Board of Direction had made an allowance of \$2.00 per member for the Local Sections. In this connection, he also announced that the Board of Directors of the Section would reduce the dues of members for 1924 provided the allotment from the Society is continued.

Professor Charles Derleth, Jr., introduced Mr. Falk and Maj. Burns, and Maj. Burns addressed the meeting briefly.

Professor Derleth also announced "Engineers' Day", to be held by the Engineering Colleges of the University of California on March 16, 1923, and extended a cordial invitation to the members of the Section to visit the University on that date and inspect the work of the colleges.

Mr. E. T. Thurston, Chairman of the Welfare Committee, reported on matters presented to that Committee at the December meeting as follows:

With reference to the report of the Committee of the Board of Direction on the desirability of a Benevolent Fund for the Society, the Welfare Committee disapproves of the creation of such a fund.

Relative to the paper by W. J. Knight, M. Am. Soc. C. E., of the St. Louis Section, entitled "Is the American Society of Civil Engineers a Progressive Institution", the Committee reported that it did not approve of the suggestions contained in that paper.

Referring to the letters of the Sacramento Section and the Los Angeles Chapter of the American Association of Engineers relative to a reported reduction in salary of the State Director of Public Works, Mr. Thurston stated that the new budget of the Board of Control had retained the \$10 000 salary of the Director of Public Works, and, therefore, no action on this matter had been taken by the Committee.

Mr. Thurston also reported for the Welfare Committee that it was favorable to the resolution of the Detroit Section relative to the discontinuance of support by the Society to the Employment Service maintained by the Founder Societies.

Director W. L. Huber reported on the Annual Meeting of the Society held in New York City, calling attention to some of the important actions taken thereat.

The subject for discussion at the meeting was the report on "Foundation Problems in the Filled-in Area of San Francisco" by the Committee on Foundation Problems in San Francisco, consisting of Messrs. A. A. Brown,

* For list of Local Sections, Officers, Rules, etc., see 1923 Year Book, p. 15.

J. M. Owens, Frank G. White, and C. Derleth, Jr. In presenting this report, Chairman Brown, outlined the problem. He was followed by Mr. Owens who treated of the history of the filled-in area of San Francisco and gave measurements showing that settlement had taken place in these areas. Mr. White reviewed the development of the San Francisco sea-wall, and Mr. Brown discussed the foundation of the Matson Building and the difficulty experienced in driving the piling to a suitable foundation. Professor Derleth who followed Mr. Brown, discussed the effect of earthquakes on structures founded in relatively soft material and the necessity of establishing all structures on a solid foundation. These reports were illustrated with many slides showing maps of San Francisco in the early days, etc., and photographs of the streets and structures damaged by the 1906 earthquake, and also of the construction work on the Matson Building. Professor Derleth exhibited a number of slides showing the effect of earthquakes in Japan as well as an earth slip in the Berkeley Hills region. The general subject was discussed briefly by other members present.

Meetings of the Colorado Section

A regular meeting of the Colorado Section was called to order at the Metropole Hotel, Denver, Colo., on March 7, 1923; President Thomas H. Olds in the chair; William B. Freeman, Secretary; and present, also, 26 members and 9 guests.

Mr. O. T. Reedy, for the Committee on Re-Districting, presented a report of that Committee, which, on motion, duly seconded, was approved, and the Committee was commended for its work and discharged.

On motion, duly seconded, it was decided that the Secretary of the Section continue to send out notices, circulars, etc., to all members of the Society in Colorado whether they are paying members of the Section or not, and, in this connection, it was decided that the annual dues of \$2 per member of the Section be continued.

On motion, duly seconded, it was decided that the Section avail itself of the space reserved for recording its proceedings in the Engineers' Bulletin of the Colorado Society of Engineers, and the Secretary was appointed official reporter to write up the proceedings for this purpose.

It was also voted to send the bulletins issued by the Engineering Societies Service Bureau to the Employment Bureau of the Colorado Society of Engineers, as that Society has better facilities than the Section for bringing positions to the attention of engineers. This action was taken subject to the approval of the Parent Society.

A communication from the Detroit Section relative to the Engineering Societies Employment Bureau was read, and, on motion, duly seconded, laid on the table.

An address on Brazil and the Construction of Irrigation Storage Reservoirs in the States of Ceara and Parahyba, by Dwight P. Robinson and Company, Incorporated, was presented by Charles W. Comstock, M. Am. Soc. C. E., who illustrated his remarks with lantern slides.

The address was followed by an interesting discussion, and, on motion, duly seconded, a vote of thanks was extended to Mr. Comstock.

SPECIAL MEETING OF THE COLORADO SECTION

A special meeting of the Colorado Section was held at Daniels' and Fisher's Lunch Room, on March 21, 1923; President Thomas H. Olds in the chair; William B. Freeman, Secretary; present, also, 17 members, and 1 guest.

The meeting was called to discuss and vote on a resolution relative to the recommendation by the Section of the appointment of a Colorado engineer as Chief Engineer on the Moffat Tunnel project.

The following resolution was presented:

"It is the sense of this meeting that a resolution be drafted to the effect that the Colorado Section of the American Society of Civil Engineers recommends the selection of a Colorado engineer for Chief Engineer of the Moffat Tunnel project and that copies of this resolution be mailed the Moffat Tunnel Commission."

On motion, duly seconded, and carried, the resolution was amended by inserting the word "qualified" before "Colorado engineer."

The amended resolution was put to vote, but was defeated.

The following resolution was then presented:

"Resolved that it is the sense of this meeting that the Moffat Tunnel Commission be requested that, in the selection of a chief engineer for the Moffat Tunnel project, preference be given to a qualified engineer who is a resident of the State of Colorado"

and, on motion, duly seconded, was carried by a vote of 12 to 1.

A motion, duly seconded, to reconsider the whole question in order that it might be sent to all the members of the Section for ballot failed to carry.

On motion, duly seconded, the Secretary was instructed to mail copies of the resolution to members of the Moffat Tunnel Commission.

Meeting of the Cleveland Section

A meeting of the Cleveland Section was called to order at the Hotel Winton on March 14, 1923; President W. E. Pease in the chair; George H. Tinker, Secretary; and present, also, 13 members and 3 guests.

The minutes of the meeting of January 10, 1923, were read and approved.

Communications from the Detroit Section in reference to the ballot on the Society joining the Federated American Engineering Societies and from the Utah Section regarding the Employment Service were read by the Secretary, but no action was taken.

The Secretary also presented communications from Secretary Dunlap of the Society in reference to a scholarship at Columbia University which has been placed at the Society's disposal, and from Richard L. Humphrey, Chairman of the Committee on the Registration of Engineers, relative to the status of registration in Ohio.

Extracts from the minutes of the meeting of the Council of the Associated Technical Societies were read, and on motion, duly seconded, the Section's proportion of bills contracted by the Council were ordered paid.

President Pease appointed Mr. K. H. Osborn as representative of the Section on the Program Committee.

A summary of the State Building Code Act submitted by Mr. H. C. Briggs through President Pease, was presented by the Secretary, and a general discussion of building code and safety code matters followed.

Meeting of the Duluth Section

A regular meeting of the Duluth Section was held on March 19, 1923; Vice-President T. F. McGilvray in the chair; W. E. Hawley, Acting Secretary; and present, also, 23 members and 6 guests.

The minutes of the meetings of February 19 and 28, 1923, were read and approved.

For the Library Committee, Mr. Frank Hutchinson reported that the Committee had received a bid for binding the volumes of the *Transactions* of the Society, explaining in detail the relative costs. After some discussion, on motion, duly seconded, the Library Committee was authorized to have the binding done in half leather.

Mr. W. H. Woodbury, Chairman of the Committee on Licensing of Engineers, presented a report of that Committee on the recent inquiry from New York relative to the position and viewpoint of the Local Sections on the subject of licensing engineers. The report was discussed by Messrs. Hutchinson and Coe and, on motion, duly seconded, action on the question was postponed until the next meeting.

The Acting Secretary presented a letter from Secretary Dunlap advising that the Board of Direction had reconsidered its action concerning the appointment of a Committee on Maps and Mapping and had laid the matter on the table. On motion, duly seconded, the Secretary was instructed to inquire for the Section the reason for such action.

A letter from Director George H. Fenkell, of the Seventh District, was presented, relative to his appointment on the Committee on Local Sections, and advising of his desire to be of assistance to members of the Section.

A letter from the Los Angeles Section, enclosing a copy of its Year Book, was presented, in which a suggestion was made for exchange of Constitution and By-Laws and notices of meetings.

Mr. Hawley read letters from the Contractors' Association of Northern California, relative to an appointment as Director of its Engineering Service, and from Mr. O. H. Dickerson and, on motion, duly seconded, a committee consisting of Messrs. Woodbury and Dresser was appointed to reply to Mr. Dickerson.

Attention was called to the circular news letter from Director Fenkell and the ballot on the question of the Society joining the American Federated Engineering Societies, but no action was taken by the meeting on these matters.

Meeting of the Kansas City Section

A regular meeting of the Kansas City Section was held at the Woman's City Club, Kansas City, Mo., on March 6, 1923; President E. M. Stayton in the chair; Henry C. Tammen, Secretary; and present, also, 21 members and 6 guests.

The reading of the minutes of the previous meeting was, on motion, duly seconded, dispensed with.

The Secretary reported further information relative to the maintenance of the Employment Bureau by the Founder Societies, and after a brief discussion of the subject, it was decided, on motion, duly seconded, to postpone action until the report of the Joint Committee of the Founder Societies on the subject was received.

The question of the Society joining The Federated American Engineering Societies was discussed by Messrs. Harrington, Stayton, Treadway, and Ash, but no action was taken by the meeting.

The business meeting was then adjourned, and the members of the Section attended a joint meeting with the Kansas City Engineers' Club at the Men's City Club.

Mr. E. L. Williams, District Engineer, U. S. Geological Survey, Water Resources Branch, addressed the joint meeting on "What is Being Done with the Water Power of Missouri", illustrating his remarks with lantern slides.

An address on the DeLavaud centrifugal method of making cast-iron pipe was presented by John D. Capron, Publicity Manager, U. S. Cast Iron Pipe and Foundry Company. This address was illustrated with motion pictures showing both the old sand cast and the new centrifugal methods of casting pipe.

Meeting of the Nebraska Section

A meeting of the Nebraska Section was called to order at the Brandeis Restaurant, Omaha, Nebr., on February 3, 1923; President George T. Prince in the chair; Homer V. Knouse, Secretary; and present, also, 13 members and 1 guest.

At the request of the Secretary, Mr. W. H. Hulsizer was appointed Acting Secretary.

Mr. J. A. Bruce presented a letter calling attention to Senate File No. 88 now under consideration by the Nebraska Legislature, together with the following resolution, which, after discussion, was, on motion, duly seconded, unanimously adopted:

"Whereas there has been introduced in the Legislature, Senate File No. 88, being an act which has in view the modification of qualifications required of an applicant for the position of General Manager of the Metropolitan Utilities District of Omaha, removing technical requirements as to education and training; and

"Whereas said Senate File No. 88 has been approved by the State Senate and is now in the hands of the committee of 'Cities and Towns' in the House, for consideration February 6, 1923; and

"Whereas said act will remove the requirements for technical qualifications and experience in the operation of such a utility as the Metropolitan Utilities District, and will therefore admit any applicant who has had business experience as an executive, but only knowledge of the development and operation of public utilities, therefore

"*Be It Resolved* by the Nebraska Section of the American Society of Civil Engineers that we respectfully petition the members of the House of Representatives of the State of Nebraska to amend said bill, including in line twelve, between the words 'business' and 'training', the words 'and technical'; and to insert the word 'in' after the word 'experience' in line twelve and insert a comma after the first 'of' in line thirteen; thus making the sentence in lines eleven, twelve and thirteen read as follows: 'No one shall be appointed General Manager who shall not possess business and technical training, executive experience in, and knowledge of, the development and operation of public utilities'; and

"*Be It Further Resolved* that a copy of this resolution be sent to every member of the House of Representatives of the State of Nebraska."

On motion, duly seconded, the President was instructed to appoint Mr. Bruce as the special representative of the Section to appear before the House Committee of the Legislature on February 6, 1923.

The minutes of the meeting of January 13, 1923, were read and approved.

The Secretary announced that Messrs. J. B. Berry and H. S. Nixon were ill and suggested that a Fraternal Committee be appointed to extend such aid as seemed desirable in such cases. On motion, duly seconded, President Prince appointed Messrs. George L. Campen, Chairman, John Latenser, Jr., and E. M. Rohrbough as such Committee.

A paper by W. J. Knight, M. Am. Soc. C. E., of the St. Louis Section, entitled "Is the American Society of Civil Engineers a Progressive Institution" was discussed by Messrs. Latenser, Rohrbough, Campen, and Meyer, and on motion, duly seconded, the Secretary was instructed to write to Mr. Knight commending his paper and expressing the appreciation of the Section.

New York Section Participates in Joint Meeting

A joint meeting of the New York Section of the Founder Societies was held at the Engineering Societies Building, on March 21, 1923; Chairman Calvert Townley of the New York Section of the American Institute of Electrical Engineers presiding; and present, also, 1310 members and guests.

The subject for discussion, "Hydro-Electric Power for the New York-New Jersey Metropolitan District", was introduced by Mr. F. W. Scheidenhelm, Consulting Engineer, who presented a co-ordinating statement of the problem, and defined the district referred to, as including New York City, Westchester County, and Northeastern New Jersey.

Mr. W. S. Murray, formerly Chairman of the Superpower Survey of the U. S. Government, gave an approximation of the available water power and the cost of delivery, outlining the Superpower Report and discussing the availability of various potential sources of hydro-power.

Mr. George A. Orrok, Consulting Engineer of the New York Edison Company, discussed the requirements of service and an evaluation of hydro-power; and Mr. F. A. Allner, Superintendent of the Pennsylvania Water and Power

Company, of Baltimore, Md., described the 100 000-kw. Holtwood Plant on the Susquehanna River and outlined the hydraulic and mechanical troubles incidental to the development and distribution of power.

Mr. Lorin E. Imlay, Consulting Engineer of the Niagara Falls Power Company, discussed the reliability of long-distance transmission, describing the growth of the transmission industry and the great increase in reliability of such service.

The papers were discussed by Messrs. John P. Hogan, W. S. Finlay, Jr., Vice-President of the American Water Works and Electric Company, and T. Kennard Thomson, followed by a general discussion of the subject from the floor.

Organization Meeting of the Rochester Section

An organization meeting of the Rochester Section was held at the University Club on February 27, 1923; E. A. Fisher in the chair; W. F. Pond acting as Secretary; and present, also, 25 members.

The minutes of two previous meetings were read and approved, and Mr. W. F. Pond presented correspondence with the Secretary of the Society and read the Constitution of the Section as approved.

The following officers were elected for the ensuing year: President, Edwin A. Fisher; First Vice-President, Alfred M. Moss crop; Second Vice-President, Thomas J. Morrison; and Secretary-Treasurer, Stanley M. Brown.

Mr. Fisher retired and Mr. Moss crop took the chair.

The question of the Society joining The Federated American Engineering Societies was discussed by Messrs. Matthews, Moss crop, and Ancona, and a letter from George F. Swain, Past-President, Am. Soc. C. E., in opposition to joining, was read by the Secretary.

On motion, duly seconded, the Chairman was instructed to appoint a committee to prepare by-laws for the Section to be submitted at the next meeting, and, subsequently Messrs. Brown, Skinner, Pond, and Ancona were appointed as such Committee.

On motion, duly seconded, it was decided that the reading and discussion of technical papers was to be at the discretion of the Board of Direction, and it was the sense of the meeting that the Section meet when some question affecting the Society is under discussion or when there is an opportunity of entertaining some prominent engineer.

It was also decided that guests might be invited by individual members to any meetings, except where notice is given and the meeting is called to discuss a question of policy of the Society.

It was also suggested that papers might be discussed by the members before their presentation to the Society.

Meetings of the Seattle Section

The Annual Meeting of the Seattle Section was called to order at the Engineers Club on January 29, 1923; President F. F. Sinks in the chair; Frank H. Fowler, Secretary; and present, also, 25 members and 2 guests.

The address of the evening was made by Judge Reid, of Tacoma, Wash., Vice-President of the Northern Pacific Railroad, whose subject was "Some Phases of the Railroad Question".

President Sinks, in the Annual Address, reviewed the aims and accomplishments of the Section during the past year.

On motion, duly seconded, the Annual Report of the Treasurer was adopted and the bills were ordered paid.

The minutes of the last Annual Meeting were read and approved.

The following officers were elected for the ensuing year: President, William F. Allison; Vice-President, R. J. Middleton; and Secretary-Treasurer, Frank H. Fowler.

On motion, duly seconded, the matter of dues in the Local Section was referred to the officers of the Section for report.

MEETING OF FEBRUARY 26, 1923.

A meeting of the Seattle Section was called to order at the Engineers Club on February 26, 1923; President William F. Allison in the chair; and Frank H. Fowler, Secretary.

The minutes of the Annual Meeting of January 29, 1923, were read and approved.

A report of the Committee with reference to joining The Federated American Engineering Societies was read by Mr. A. O. Powell, and a motion that the Section go on record in this matter was ruled out of order.

On motion, duly seconded, the following resolution to increase the appropriation of joint State and Federal hydrographic and topographic work was carried:

"Whereas, The Appropriations Committees of the present Legislature have provided only \$20 000 for co-operative work with the Federal Government for the conduct of Hydrographic and Topographic Work for the next biennium; and,

"Whereas, The need for this work, particularly the hydrographic work, is more needed now than ever before and cannot be curtailed or any portion of it discontinued without serious injury to the development of our water resources; and

"Whereas, The irrigation, power, and public water supply interests really call for an extension, rather than a curtailment of the service,

"Therefore, Be It Resolved, That the Seattle Section, American Society of Civil Engineers, hereby urges the Legislature to make the appropriation at least as large as it was for the last biennium."

On motion, duly seconded, the Secretary was instructed to send telegrams to the President *pro tem.* of the State Senate and the speaker of the House.

A paper by Professor J. Charles Rathbun, on "Stress in a Masonry Skew Arch Bridge", was presented by the author.

A motion was adopted urging Professor Rathbun to present his paper to the Parent Society, and the Section to request the Parent Society to publish it.

MEETING OF MARCH 26, 1923.

A regular meeting of the Seattle Section was held at the Engineers' Club, on March 26, 1923; President W. H. Allison in the chair; Frank H. Fowler, Secretary; and present, also, 30 members and guests.

The minutes of the meeting of February 26, 1923, were read and approved.

A letter from Secretary Dunlap of the Society relative to the visit of Mr. Calvin W. Rice, Secretary of the American Society of Mechanical Engineers, was, on motion, duly seconded, referred to the Entertainment Committee.

The Secretary presented a letter from Superintendent of Buildings Proctor regarding dry rot in the floors of the Overland Motor Company's building.

In an address on the subject, Professor Grondahl stated that the following four conditions were necessary for the occurrence of dry rot: (1) A temperature of from 80 to 90 degrees; (2) air in the wood; (3) a condition of dry wood to the amount of 15° or more; and (4) the presence of food. Professor Grondahl pointed out that the preventative measures include poisoning of the wood by treatment with timber poisons prepared by the use of one of the following compounds: Creosote, zinc chloride, sodium fluoride, bichloride of mercury, or copper sulphate.

The subject was also discussed by Messrs. Naramore, Howes, Bowen, Jacobs, Jackson, Sylliaasen, and Proctor.

On motion, duly seconded, a vote of thanks was extended to Professor Grondahl.

On motion, duly seconded, the following resolution was adopted:

"Whereas, the last State Legislature cut down from \$35 000 to \$20 000 the appropriation for hydrographic and topographic co-operative work with the Federal Government for the next biennium; and

"Whereas, The hydrographic work heretofore carried on under the co-operative arrangement cannot be efficiently maintained on a lesser appropriation than has heretofore been available for it; and

"Whereas, A discontinuance of any of the important gauging stations now maintained would be an irreparable loss and a handicap to future development work depending on the records of such stations; and

"Whereas, Topographic work can, without any actual loss and without inconvenience other than that of delay, await a day of more liberal appropriations for its fuller prosecution; therefore,

"Be It Resolved, That the President of the Section address a letter jointly to the Director, United States Geological Survey, Washington, D. C., and the Director, Department of Conservation and Development, Olympia, Washington, urging that, of the total funds available for co-operative work for the next biennium, \$30 000 be allotted to hydrographic work."

Mr. Thomas R. Beeman was appointed Chairman of the Membership Committee.

On motion, duly seconded, the Secretary was authorized to finance the publication of a Year Book of the Section.

Meetings of the Virginia Section

A joint meeting of the Virginia Section with the Sections of the American Society of Mechanical Engineers, the American Institute of Elec-

trical Engineers, and the Richmond Chapter of the American Association of Engineers, was held at the Richmond Hotel, Richmond, Va., on January 22 and 23, 1923.

The meeting of January 22, 1923, was called to order at 10:00 A. M.; President J. C. Carpenter of the Section in the chair.

President Carpenter introduced Mr. Allen J. Saville, Chairman of the Committee on Program for the Meeting, who took the chair and presided at the morning session.

Mr. J. N. Ambler presented an interesting paper on the "Filtration Plant and Water Supply System at Ashland, Virginia", illustrating his remarks with lantern slides.

The next speaker was Mr. Richard Messer, Chief Engineer of the State Board of Health of Virginia, whose subject was "State Supervision of Public Water Supplies in Virginia". This paper brought out considerable discussion and showed the value of the work that is being done by the State Board.

Thomas C. Atwood, M. Am. Soc. C. E., of Chapel Hill, N. C., gave a very interesting lecture on "The Catskill Aqueduct", illustrating his talk with a number of interesting slides showing the work on the system.

Through the courtesy of Mr. M. B. Ogden, Manager of the Contractors' Equipment Department, of the Smith-Courtney Company, several reels of motion pictures presenting the construction equipment manufactured by the Austin Machinery Corporation, of Toledo, Ohio, were shown. Machinery best suited to the use of municipal construction and maintenance work were shown in these films.

INSPECTION TRIPS

On the afternoon of January 22, 1923, trips of inspection were made to the plants of the American Locomotive Works, the Whitlock Branch of the P. Lorillard Tobacco Company, and the Standard Paper Manufacturing Company.

BUSINESS MEETING OF THE VIRGINIA SECTION

A business session of the Virginia Section was called to order on January 22, 1923; President J. C. Carpenter in the chair; Lee H. Williamson, Acting Secretary.

The following officers were elected for the ensuing year: President James A. Anderson; Vice-Presidents Frank M. Weakley, P. B. Winfree; and R. B. H. Begg.

On motion, duly seconded, the following resolution was adopted:

"Moved that the Virginia Section, American Society of Civil Engineers, join with the other technical bodies of the State in the formation of a Technical Council to be composed of three representatives of each individual organization, except in the case of organizations having three or more chapters or sections in the State, in which case each chapter shall have one representative. Voting power to be by organizations and not by individuals or chapters".

After dinner served in the ballroom of the Richmond Hotel, Mr. Allen J. Saville as Toastmaster, introduced Dean A. N. Johnson of the University

of Maryland, President of the American Association of Engineers, who reviewed the purposes and accomplishments of the Association.

Dean Johnson was followed by Dean William M. Thornton of the University of Virginia and President of the Virginia Section of the American Society of Mechanical Engineers, who presented an interesting address on Industrial Conditions.

JOINT MEETINGS OF JANUARY 23, 1923

The first meeting was called to order at 10:00 A. M., on January 23, 1923; President Carpenter of the Virginia Section of the Society in the chair.

The first speaker was Mr. S. C. Rogers of Lynn, Mass., who discussed "Street Lighting", illustrating his remarks with lantern slides.

A paper on "The Basis of Design of Storm Sewers", by Mr. Thomas Towles, who was unable to be present on account of illness, was read by Mr. Allen J. Saville. In this paper, Mr. Towles discussed the methods used in designing the Shockoe Creek Sewer for the City of Richmond.

Mr. J. N. Eubank, of the Department of Public Works of Richmond, reported on the operation of the Bureau of Street Cleaning for 1922.

The afternoon session, which was called to order at 2:00 P. M., was opened by Director Ezra B. Whitman, who described some of the work of the American Society of Civil Engineers, especially in relation to Local Sections.

Mr. G. M. Bowers, Chief of the Bureau of Surveys of Richmond, presented a paper on "Maps for City Planning", which he illustrated with specimen maps of a survey of the outlying territory about Richmond.

A paper by Mr. Brockenbrough Lamb on the "Legal Aspects of Zoning", was presented by the author, and a paper by Mr. William T. Lyle, entitled "City Planning: A Discussion", was presented by President Carpenter.

At the evening session which was called to order in the Auditorium of the John Marshall High School, Mr. L. W. Wallace, Secretary of the Federated American Engineering Societies, presented an interesting paper on "Industrial Waste".

The final address was made by Mr. E. P. Goodrich, of the Technical Advisory Corporation of New York City, on "Zoning and City Planning", and was illustrated by motion pictures and a series of lantern slides.

Minutes of Meetings OF THE TECHNICAL DIVISIONS

Sanitary Engineering Division

(Abstract)

January 16, 1923.—A meeting of the Executive Committee of the Sanitary Engineering Division was held at Society Headquarters, at which the following members were present: Messrs. Kenneth Allen, Chairman; Harrison P. Eddy, J. Frederick Jackson, and George T. Hammond.

After discussion, the By-Laws of the Division were considered, article by article, and adopted as follows, with slight editorial changes. Possible alternate sections or clauses, not read at the meeting, are indicated by parentheses:

Article I.—Objects.—

1. The objects of this Division shall be the increase of knowledge in and the advancement of the sanitary branch of the engineering profession, and the encouragement of social intercourse among sanitary engineers and sanitarians, to the end that sanitary engineers may be of greater service to the community.

Article II.—Membership.—

1.—The membership of the Division shall consist of Division Members and Division Affiliates.

2.—A Division Member shall be a member of the American Society of Civil Engineers, of any grade, who shall have applied to the Secretary of the Society for enrollment in the Division. Division Members shall be divided into two classes: Class 1 consisting of Corporate Members of the Society, who alone are eligible to office in the Division, and Class 2 consisting of all other Division Members, who shall be entitled to all the other rights and privileges of membership.

3.—A Division Affiliate shall be an engineer, chemist, biologist, physician, health officer, superintendent of water, sewage, or garbage works, teacher, or other person who has been actively engaged in work correlated to sanitary engineering for at least 6 years, of which at least 1 year shall have been in a position of responsibility, and who shall be at the time of his admission not less than 25 years of age. Graduation from a scientific school of recognized reputation shall be considered as equivalent to two years active practice.

4.—Applications for enrollment as Division Affiliates shall be made to the Chairman of the Executive Committee, and Division Affiliates shall be admitted only by unanimous vote of the Committee.

5.—Division Affiliates shall be entitled to all the privileges of membership in the Division, except voting and holding office. They shall be eligible to serve upon technical committees. They shall be subject to removal at any time, for cause, by unanimous vote of the Executive Committee after due notice and a hearing.

(Article II.—Membership (Alternate Form).—

1.—The membership of the Division shall be limited to members of the American Society of Civil Engineers, of any grade, who shall have applied to the Secretary of the Society for enrollment in the Division.

2.—Such Division Members shall be divided into two classes: Class 1 consisting of Corporate Members of the Society, who alone are eligible to office in the Division, and Class 2 consisting of all other Division Members, who shall be entitled to all the other rights and privileges of membership.)

Article III.—Dues.—

1.—Members of the Society enrolled as Division Members shall be exempt from dues other than those paid to the Society.

2.*—Division Affiliates shall pay annual dues of \$5.00, which shall be payable in advance of January 1 to the Secretary of the Society. Payment of such dues shall not entitle Division Affiliates to the publications of the Society.

Article IV.—Executive Committee.—

1.—The general direction of the affairs of the Division shall be vested in an Executive Committee of five, chosen annually by the Division Members from the Division Members of Class 1.

2.—Nominations for the Executive Committee shall be made by a Nominating Committee of five Division Members appointed by the Executive Committee (or, elected at the annual meeting of the Division). The report of the Nominating Committee shall be made to the Secretary of the Society in ample time so that it may be sent out by him with the report of the Nominating Committee of the Society. Additional nominations may thereafter be made by declaration in the same manner as prescribed in Article VII, Section 7, of the Constitution of the Society, provided that such declaration shall be signed by at least 25 Division Members.†

3.—Election to the Executive Committee shall be by letter ballot to be prepared and sent out by the Secretary of the Society in the same manner as provided in Article VII, Sections 8 and 9, of the Constitution of the Society. They shall be canvassed by the Secretary at a time to be fixed by him so as to make it possible for him to certify the results to the Division Meeting held in connection with the Annual Meeting of the Society. The five persons receiving the largest number of votes shall be declared elected. In case of uncertainty resulting from a tie vote, the meeting shall decide which of the persons receiving the same number of ballots shall be declared elected.

The Executive Committee shall assume office at the close of the Division Meeting held in connection with the annual meeting of the Society, and shall meet for organization immediately thereafter.

4.—Should a vacancy occur in the Executive Committee, it shall be filled by vote of the remaining members.

5.—A quorum of the Executive Committee shall consist of three members, but questions may be considered in the Executive Committee without holding a meeting, and may be decided by letter ballot, provided, however, that such ballot shall be received from the entire membership of the Committee.

Article V.—Officers.—

1.—The Executive Committee shall elect one of its members as Chairman, and he shall be Chairman of the Division.

2.—The Executive Committee shall elect a Clerk from the Division Members. Members of the Executive Committee shall be ineligible to election as Clerk (or, a member of the Executive Committee may be elected as Clerk).

3.—The Chairman shall preside at all meetings of the Division and of the Executive Committee. In his absence, the Clerk shall call the meeting to order and a temporary chairman shall be chosen.

* Unnecessary if alternate form of Article II is adopted.

† Note that in the above form, the number of nominations is not definitely prescribed. The Nominating Committee might submit any number of names, from five up, in its discretion, and it would be within the province of the Annual Meeting to instruct the Nominating Committee how many nominations to bring in. If thought desirable a new sentence could be inserted after the first sentence of this section to the effect that two or three times as many names should be presented by the Nominating Committee as there are places to be filled.

4.—The Clerk shall keep the records of all meetings of the Division and of the Executive Committee.

Article VI.—Meetings.—

1.—Regular meetings of the Division shall be held in connection with the Annual Meeting and Annual Convention of the Society. Special meetings may be held at such time and place as may be designated by the Executive Committee.

2.—At all regular and special meetings, 15 Division Members shall constitute a quorum.

3.—Regular meetings of the Executive Committee shall be held in connection with the prescribed regular meetings of the Division, one before the time of the Annual Meeting of the Society in order to close the business of the year, and one following the Annual Meeting for the organization of the new Executive Committee. Other meetings of the Executive Committee shall be held at the call of the Chairman or of any three members of the Committee.

4.—Local meetings for the discussion of Sanitary Engineering matters may be held under the auspices of the Division, at any time and place, upon the request of ten Division Members, if approved by the Chairman, provided that no unauthorized expense to the Society or to the Division is involved. The Chairman shall designate a local committee to have charge of the meeting, which shall appoint a chairman and a clerk. A report of the Proceedings of such local meeting shall be made to the Executive Committee by the local committee within 15 days after such meeting.

Article VII.—Amendments.—

1.—These By-Laws may be amended by a two-thirds vote at any regular or Special meeting of the Division, provided that the proposed amendment shall have been printed in the call for the meeting.

2.—Amendments shall take effect upon adoption and approval by the Board of Direction of the Society.

The following members have been chosen as the Executive Committee of the Sanitary Engineering Division: Kenneth Allen, *Chairman*; Harrison P. Eddy, X. Henry Goodnough, George T. Hammond, J. Frederick Jackson.

Irrigation Division

(Abstract)

January 19, 1923.—The organization meeting of the Irrigation Division met in the Engineering Societies Building at 8:35 P. M., 8 members being present.

Mr. D. C. Henny was chosen as Chairman, and Mr. C. E. Beam as Secretary, of the meeting.

It was decided that a Constitution for the Division should be the first order of business, and Mr. Grunsky read the proposed draft of the plan of organization formulated by a committee composed of Messrs. C. E. Grunsky, Thomas H. Means, and B. A. Etcheverry, appointed October 5, 1922, by 30 members attending the Fall Meeting, at San Francisco, Calif. Each paragraph of this plan was considered separately and the following Constitution was adopted:

Object of Organization.—To bring into closer contact engineers interested in irrigation; to provide for an organization through which the members of the Division may collect, collate, digest and prepare for discussion and pub-

lication data on irrigation and subjects allied thereto; to distribute among the members of the Division the material collected; to arrange through committees for the preparation of this material for publication; to promote the holding of occasional meetings of the parent society for the purpose of discussing irrigation; and to arrange for Division and general meetings; and to promote and encourage research in matters of interest to irrigation engineers.

Membership.—Members of the American Society of Civil Engineers of any grade may become members of the Division by enrollment with the Secretary of the American Society of Civil Engineers at New York.

Engineers and others not members of the American Society of Civil Engineers desiring to participate in the work of the Division may be enrolled as Division Affiliates upon approval of the Executive Committee of the Division. Such Division Affiliates shall not in any sense be members of the American Society of Civil Engineers in any grade, but shall have the privilege of attending meetings of the Division, presenting papers and taking part in the discussion, but shall not have the right to vote.

Organization Officers.—The direction of the work of the Division is to be in the hands of an Executive Committee of five members. This Executive Committee will select a Chairman and Secretary-Treasurer from its membership.

The first Executive Committee shall be elected at a meeting of the Division at New York at the time of the Annual Meeting of the American Society of Civil Engineers, the place and hour of such meeting to be fixed by the members of the Board of Direction of the American Society of Civil Engineers who are also members of the Division.

The Executive Committee shall make provision for the annual election of the Executive Committee thereafter.

Committees.—Committees on various phases of the Division's endeavors are to be appointed by the Executive Committee. Committees are to be appointed on the following subjects upon organization of the Division, and are to co-operate with Committees of the Parent Society and of other societies dealing with kindred subjects: Interstate water matters; duty of water studies; co-operation with Federal and State research agencies; meeting of Parent Society on irrigation; drainage of irrigated lands.

The Executive Committee may, from time to time, add such committees as seem necessary.

Financial.—There shall be no dues for Members. The dues of Affiliate Members shall be fixed by the Executive Committee. The Executive Committee shall have power to call for voluntary contributions.

Changes in the Constitution.—Changes in the Constitution may be made, if approved by a majority voting by letter ballot authorized by the Executive Committee upon its own initiative or upon the receipt of a petition to that effect signed by at least fifteen members.

On motion, duly seconded and passed, the following members of the Executive Committee were selected: Thomas H. Means, Chairman, B. A. Etcheverry, F. H. Fowler, C. E. Tait,* and A. L. Sonderegger.

Highway Division

(Abstract)

January 19, 1923.—The organization meeting of the Highway Division was called to order at 8 P. M., by J. C. Carpenter, M. Am. Soc. C. E., 21 members being present.

* Died April 6, 1923.

Mr. Carpenter was elected Temporary Chairman and Mr. John H. Dunlap Temporary Secretary.

It was the sense of the meeting that the Division would be of service to the profession in collecting, digesting, and distributing information in regard to recent practice in highway work, so that the information now available may be obtained from one source rather than from numerous, widely-separated organizations.

On motion, the Chairman was authorized to appoint a committee to nominate five men for the Executive Committee of the Division, the names of these men to be sent out by the Secretary of the Society to highway engineers in the Society. A Nominating Committee, composed of Messrs. Paul D. Sargent and T. Warren Allen, brought in the names of Messrs. C. J. Bennett, C. D. Curtiss, W. K. Hatt, Clifford Older, and H. G. Shirley. It was moved, seconded, and passed, that the report of the Nominating Committee be accepted and presented to the Division for ballot. On motion, the Nominating Committee was empowered to fill vacancies on the Executive Committee, caused by declination of any member on the list selected.

Tentative By-Laws were read, section by section, and adopted as read. The By-Laws, as finally adopted, are as follows:

Article I.—Objects of the Organization.—The objects of the Highway Division of the American Society of Civil Engineers are, to bring into closer contact engineers interested in highway engineering; to provide for an organization through which the members of the Division may collect, collate, digest, and prepare for discussion and publication data on highway engineering and subjects allied thereto; to distribute among the members of the Division the material collected; to arrange through committees for the preparation of this material for publication; to promote the holding of occasional meetings of the Parent Society for the purpose of discussing highway engineering; to arrange for Division and general meetings; and to promote and encourage research in matters of interest to highway engineers.

Article II.—Membership.—Members of the American Society of Civil Engineers of any grade may become members of the Division by enrollment with the Secretary of the American Society of Civil Engineers at New York.

Engineers and others not members of the American Society of Civil Engineers desiring to participate in the work of the Division may be enrolled as Division Affiliates upon approval of the Executive Committee of the Division. Such Division Affiliates shall not in any sense be members of the American Society of Civil Engineers in any grade, but shall have the privilege of attending meetings of the Division, presenting papers and taking part in the discussion, but shall not have the right to vote.

Article III.—Organization and Officers.—The direction of the work of the Division is to be in the hands of an Executive Committee of five members. This Executive Committee will select a Chairman and Secretary-Treasurer from its membership.

The first Executive Committee shall be elected by letter ballot, as provided for at the meeting of the Division at the time of the Annual Meeting.

The Executive Committee shall make provision for the annual election of the Executive Committee thereafter.

Article IV.—Committees.—Committees on various phases of the Division's endeavors are to be appointed by the Executive Committee.

Article V.—Finances.—There shall be no dues for the members, but the dues of the Division Affiliates shall be fixed by the Executive Committee. The Executive Committee shall have power to call for voluntary contributions.

It was the sense of the meeting that the Committee on Technical Activities and Publications of the Society be asked to arrange a session of the Highway Division at the next Annual Meeting of the Society to be held in January, 1924.

Power Division

(Abstract)

January 19, 1923.—The organization meeting of the Power Division was called to order at Society Headquarters, at 8:15 p. m.; Mr. John P. Hogan in the chair.

After discussing the objects of the Division and asking Mr. E. W. Maloney to act as Temporary Secretary, Mr. Hogan asked Mr. George A. Orrok to take the chair.

On motion, the Chairman appointed Messrs. John P. Hogan, B. E. White, O'K. Myers, O. C. Merrill, and N. A. Carle, as a Nominating Committee, which selected the following names for members of the Executive Committee: Messrs. George A. Orrok, Francis Blossom, F. W. Scheidenhelm, and N. G. Grover, who have subsequently been elected.

After discussion, it was decided that the dues for membership in the Division should be \$1.00 per year.

On motion, duly seconded and passed, the Executive Committee was empowered to appoint a Secretary of the Division, to fix the dates of meetings, and to take such action as may be necessary to the organization of the Division.

The Executive Committee was also empowered to prepare a list of subjects for use at future meetings during the year.

On motion, it was decided to submit the preliminary draft of the Power Test Code, with reference to power plants and turbines, and also the subject of ice problems, to the Executive Committee for consideration.

Mr. John H. Lawrence, Chairman of the Professional Divisions Committee of the American Society of Mechanical Engineers gave a brief address on the work of the Divisions of that Society.

OF SPECIAL COMMITTEES

Special Committee on Stresses in Structural Steel

(Abstracts)

January 31, 1923.—The meeting was held at the Headquarters of the Society. Present, F. O. Dufour (Chairman), J. H. Edwards, F. E. Schmitt, Clement E. Chase, and W. J. Thomas.

The minutes of the previous meeting were read and approved.

After some discussion, it was decided, on motion, duly seconded, to instruct Sub-Committee No. 1 to investigate the question of bastard steel, that is, to determine the extent of its use and compare it with the total quantity of pedigreed stock used.

Letters indicating the co-operation of both the U. S. Bureau of Commerce and the U. S. Bureau of Standards with the Committee were mentioned.

Reports were presented, as follows: From Sub-Committee No. 1 relative to co-operation with various steel companies in the supplying and compilation of mill test data; from Sub-Committee No. 3 relative to work assigned to its various members to investigate tension members, beams, channels and girders, and compression members; and from Sub-Committee No. 4, to the effect that letters had been sent to various societies and engineers in England, France, Italy, and Germany, asking for information regarding foreign structural steel specifications.

It is suggested that the attention of Professor Talbot of the Column Committee be called to the advisability of a member of the Committee on Stresses in Structural Steel being included in the personnel of that Committee.

Discussion was had relative to the types of questions and problems to be reported on by the Committee, and an additional Sub-Committee No. 5, composed of Messrs. Schmitt, Edwards, and Thomas, was appointed to formulate a program and practical method of procedure to enable the Committee to arrive at a logical conclusion regarding the proper allowable unit stress after data on the subject have been accumulated.

Members of the Committee discussed the relation between behavior of columns under axial loads only and columns subjected to axial loads combined with bending moment (due to transverse forces), both columns developing the same maximum stress, in order to bring out a phase of the stress analysis work before the Committee.

A letter from the American Institute of Steel Construction to Mr. L. D. Rights was noted, and it was stated that Mr. Thomas would keep the Committee in touch with the Institute Committee on Stresses.

The meeting was adjourned at 4:30 P. M., to meet in the rooms of the Western Society of Engineers, Monadnock Building, Chicago, Ill., in March, the exact date to be set later.

March 14, 1923.—A meeting of the Special Committee on Stresses in Structural Steel was held at the Headquarters of the American Railway Engineering Association, in Chicago, Ill. Present, F. O. Dufour (Chairman), O. F. Dalstrom, F. W. Masters, J. H. Edwards, F. E. Schmitt, Clement E. Chase, and R. J. Fogg.

The minutes of the meeting of January 31, 1923, were approved.

As the work of the Committee indicated that an increase in membership would be advantageous, it was moved, seconded, and carried, that Chairman Dufour write to President Loweth to that effect, recommending the names of several members of the Society as well fitted to serve on the Committee.

On motion, duly seconded, the Committee decided to confine its attention to and report on structural steel and to include in its Final Report a recommendation that the feasibility of raising the present strength of structural steel be investigated.

Mr. Chase, reporting for Sub-Committee No. 7, stated that printed forms for entering mill test data had been prepared and sent to the various steel companies.

In order to compare laboratory and commercial tests, the Carnegie, Illinois, and Jones and Laughlin Steel Companies will furnish the Committee with twin coupons for testing purposes.

A progress report was received from Sub-Committee No. 3.

For Sub-Committee No. 4, Mr. Fogg reported that requests had been made to societies and engineers in England, France, Belgium, Switzerland, Germany, and Italy for copies of specifications and building codes for steel buildings used in these countries, on receipt of which a study of the structural steel situation abroad will be made and reported on.

Chairman Dufour stated that he was working on definitions of various terms which would be used in the work of the Committee and hoped to be able to submit them shortly to the Committee.

The question of difference in requirements as to degree of softness of structural steel to be used in buildings and bridges was discussed, during which it was stated that there were no good reasons why building steel should be softer than bridge steel.

Relative to the column tests being conducted by the U. S. Bureau of Standards, it was hoped that some of the members of the Committee might witness these tests, and it was suggested that the members of the Committee might obtain valuable information from the report on "Rail", as published in *Bulletin No. 251* of the American Railway Engineering Association, and the Third Progress Report of the Special Committee of the Society on Stresses in Railroad Track, as published in *Proceedings* for March, 1923.

The meeting was adjourned at 5:15 P. M., to meet during the first two weeks of May, 1923, the exact date to be fixed later.

Joint Committee on Stresses in Railroad Track

(Abstract)

March 13, 1923.—The meeting was held at the Congress Hotel, Chicago, Ill., on March 13, 1923. Present, A. N. Talbot (Chairman), J. H. Bremner, Mr. Bronson representing Dr. P. H. Dudley, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, W. M. Dawley, Mr. Gennet representing R. W. Hunt, J. B. Jenkins, Paul M. LaBach, C. G. E. Larsson, Albert F. Reichman, F. E. Turneure, and J. E. Willoughby.

The manner of presenting the Third Progress Report of the Committee to the Annual Convention of the American Railway Engineering Association was considered.

The status of the arrangements for tests with electric locomotives on the Chicago, Milwaukee and St. Paul Railway, and other work of the Committee for the coming year, were reported and discussed.

Diagrams showing the ratios of stresses at the outer edge of the base of the rail to mean stress were shown and discussed.

The purpose and effect of the coning of wheels and the canting of the rail were considered at length, and the possibility of obtaining conclusive results by means of tests was discussed.

Announcements

The Reading Room of the Society is open from 9 A. M. to 6 P. M., and from 7 P. M. to 10 P. M., every day, except Sundays, New Year's Day, Washington's Birthday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 5 P. M.

Future Meetings

May 2, 1923.—8:00 P. M.—A regular business meeting of the Society will be held, and a paper by Joel D. Justin, M. Am. Soc. C. E., entitled "The Design of Earth Dams", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

Annual Convention

The Fifty-third Annual Convention of the Society will be held at Chicago, Ill., on July 11, 12, and 13, 1923. The tentative program for the Convention is as follows:

Wednesday, July 11, 1923, 10 A. M.—Address of Welcome, followed by the Annual Address by Charles F. Loweth, President, Am. Soc. C. E.

July 11, 1923, 11 A. M.—Technical Session and Business Meeting.

July 11, 1923, 2 P. M.—Meetings of the Technical Divisions of the Society and a Local Excursion.

July 11, 1923, 7:30 P. M.—President's Reception and Dinner Dance.

Thursday, July 12, 1923, 10 A. M.—Technical Session.

July 12, 1923, 3 P. M.—Local Excursion.

July 12, 1923, 8 P. M.—Technical Session.

July 12, 1923, 9 P. M.—Smoker.

Friday, July 13, 1923.—All-Day Excursion by Boat.

Searches in the Library

As the Library of the American Society of Civil Engineers has been merged in the Engineering Societies Library, requests for searches, copies, translations, etc., should be addressed to the Director, Engineering Societies Library, 29 West 39th Street, New York City, who will gladly give information concerning the charges for the various kinds of service. A more comprehensive statement in regard to this matter will be found on pages 35 and 36 of the Year Book for 1923.

ASSOCIATE MEMBERS—(Continued)

		Date of Membership.
HARRISON, MAURICE ROWLEN. Pres. and Gen. Mgr., Harrison Transportation, 413 Kraft Bldg., Des Moines, Iowa.....		Mar. 12, 1923
HEILMANN, HERBERT WILLIAM. Asst. County Engr., Essex County; Engr. and Surv., 95 West End Ave., Newark, N. J.....		Mar. 12, 1923
HUESTIS, ROBERT ALEXANDER. Engr., Doyle & Merriam, 1141 Seventeenth Ave., North, Seattle, Wash.	} Jun. Assoc. M.	July 6, 1920
		Mar. 12, 1923
JONES, WILLIAM EDWARD, JR. Engr. of Road Design, Iowa Highway Comm., Ames, Iowa.....		Mar. 12, 1923
KRIEG, CHARLES RICHARD. Engr., Moran, Maurice & Proctor, New York City (Res., 107 Ninety-sixth St., Woodhaven, N. Y.)..		Mar. 12, 1923
LANPHER, EDWARD STABLER. Supt. of Lighthouses, 8th Dist., 1204 State St., New Orleans, La.....		Mar. 12, 1923
McFARLANE, WALTER DANIEL. Field Engr., City Engr.'s Office, 746 Green Ave., South, Detroit, Mich.....		Mar. 12, 1923
McGEE, ARTHUR BRANCH. Engr., Standard Oil Co., Bakersfield (Res., 1487 North Los Robles Ave., Pasadena), Calif.....	} Jun. Assoc. M.	Jan. 14, 1918
		Mar. 12, 1923
MANSFIELD, BRUCE JEFFERSON. Structural Engr. and Draftsman, Thomas W. Marshall, 729 Fifteenth St. (Res., 1119 K St., N. W.), Washington, D. C.....		Mar. 12, 1923
NITTEBERG, CARL THEODORE. Highway Bridge Engr., U. S. Bureau of Public Roads, 1912 F. & M. Bank Bldg., Fort Worth, Tex.		Jan. 15, 1923
OLERI, FRANK JOHN. Town Engr. and Surv., 630 Bergenline Ave. (Res., 119 Twentieth St.), West New York, N. J.....	} Jun. Assoc. M.	Mar. 14, 1916
		Mar. 12, 1923
PRIEST, RALPH NOBLE. Structural Engr., 1627 Sansom St., Philadelphia, Pa.		Mar. 12, 1923
ROBINSON, CHARLES CUSTER. Archt. (Charles M. Robinson); Cons. Engr. for H. W. Witcover, 1002 Times Despatch Bldg., Richmond, Va.		Mar. 12, 1923
SCHANTZ, CLARENCE PAUL. Superv. Draftsman, Bridge Dept., P. R. R., Room 670, Broad St. Station (Res., 4559 North Morris St.), Philadelphia, Pa.	} Jun. Assoc. M.	June 1, 1920
		Mar. 12, 1923
SLUSHER, SYDNEY GEORGE. Cons. Engr., 116 West 4th St., Tulsa, Okla.		Mar. 12, 1923
THIEBAUD, CLIFFORD JUSTI. Asst. Supt. of Constr., Sinclair Refining Co., Coffeyville, Kans.....		Mar. 12, 1923
VASSAR, CHARLES DAVID. Engr., U. S. Shipping Board, Emergency Fleet Corporation, 917 Longfellow St., N. W., Washington, D. C.		Mar. 12, 1923
VAWTER, JAMISON. Asst. Prof., Civ. Eng., Univ. of Illinois, 217 Eng. Hall, Univ. of Illinois, Urbana, Ill.....		Jan. 15, 1923

AFFILIATES

FITZGERALD, JAMES FRANCIS. Pres., J. F. Fitzgerald Constr. Co., 294 Washington St., Boston, Mass.....	Mar. 12, 1923
---	---------------

JUNIORS

ANDERSON, WALTER WOOD. Technology Club of New York, 17 Gramercy Park, New York City.....	Jan. 15, 1923
--	---------------

JUNIORS—(Continued)

	Date of Membership.
BOBLOW, REUBEN. Draftsman, Survey Bureau, New York Edison Co., 120 East 116th St., New York City.....	Mar. 12, 1923
BRAYER, EDWARD HAROLD. 202 Pearson Bldg., Auburn, N. Y.....	Mar. 12, 1923
BUCHWALTER, SAMUEL JOSEPH. Structural Draftsman, New York State Dept. of Architecture, 230 West 111th St., New York City	Mar. 12, 1923
CAULFIELD, HENRY JOHN. Associated with George Byars, 602 North 12th St., Waco, Tex.....	Mar. 12, 1923
CLAYTON, ROBERT LEE. Asst. County Engr., McLennan County, Care, County Engr., Waco, Tex.....	Jan. 15, 1923
COLE, RAY CHANUCEY. Bldg. Insp., City of Manchester, 60 George St., Manchester, N. H.....	Mar. 12, 1923
CONE, RUSSELL GLENN. Junior Engr., Field Div., Delaware River Bridge Joint Comm., 416 North 52d St., Philadelphia, Pa..	Dec. 4, 1922
FISHBECK, DEWEY GEORGE. Draftsman, Turner Constr. Co., 244 Madison Ave. (Res., 108 West 74th St.), New York City....	Mar. 12, 1923
GARFINKEL, HARRY. With Berlin Constr. Co., 3 Trinity St., New Britain, Conn.	Mar. 12, 1923
GOLINSKI, STEPHEN WILLIAM. 418 South Grove St., Newark, N. J.	Mar. 12, 1923
GRAMSTORFF, EMIL ANTON. Instr., Civ. Eng. School, Northeastern Univ., 316 Huntington Ave., Boston, Mass.....	Mar. 12, 1923
HENRY, HOWARD CARROLL. 351 Hubert Ave., Springfield, Ohio....	Mar. 12, 1923
KANEGSBERG, RICHARD. Instr., Civ. Eng., The Polytechnic Inst., Brooklyn, N. Y. (Res., 173 North 17th St., East Orange, N. J.)	Mar. 12, 1923
KIEHNLE, WILLIAM ALBERT. Builder (William V. Kiehle Co.), 3606 Park Ave., New York City.....	Mar. 12, 1923
LAMB, GILES HARVEY, JR. Asst. County Engr., Douglas County, County Engr.'s Office, Lawrence, Kans.....	Mar. 12, 1923
McKEEVER, HAROLD JAMES. Research Graduate Asst. in Civ. Eng., Eng. Experiment Station, Room 220 Eng. Hall, Univ. of Illinois, Urbana, Ill.....	Mar. 12, 1923
McWILLIAMS, JOHN SCOTT. Box 17, Shamokin, Pa.....	Mar. 12, 1923
METZGER, HENRY LOUIS. Draftsman, Hinkle Iron Works, 2389 Hughes St., Brooklyn, N. Y.....	Mar. 12, 1923
NESSLER, FREDERICK WALTER. Care, International Petroleum Co., Eng. Dept., Apartado 162, Tampico, Tamps., Mexico.....	Dec. 4, 1922
ROUNDS, HAROLD PERCIVAL. Draftsman, Hay Foundry & Iron Works, 450 High St., Newark, N. J.....	Mar. 12, 1923
SCHLEIN, BENJAMIN VERNER. Asst. Engr., C. E. Wunder, 1915 North Park Ave., Philadelphia, Pa.....	Mar. 12, 1923
THOMPSON, THORALF SANFORD. Junior Asst. Engr., New York State Comm. of Highways, 947 Eightieth St., Brooklyn, N. Y.	Mar. 12, 1923
TURNER, WEBSTER FRANKLIN. Transitman and Asst. to Res. Engr., Parkes Eng. Co., Pine Bluff, Ark.....	Oct. 2, 1922
TURK, MILTON. Engr., Fougner Concrete Steel Co., 29 Broadway (Res., 632 East 11th St.), New York City.....	Mar. 12, 1923
TYPOND, GEORGE YIP. Designer and Computer, Roger Black Co., Inc., 255 Seventh Ave., Brooklyn, N. Y.....	Mar. 12, 1923

JUNIORS—(Continued)

Date of
Membership.

WALSH, JEREMIAH MARK. Steel Draftsman, J. N. Ehrenberg, New York City (Res., 201 West 3d Ave., Roselle, N. J.)	Mar. 12, 1923
WIRTH, WALTER FERDINAND. 48 Mills St., Astoria, N. Y.	Mar. 12, 1923

Resignations

MEMBERS

Date of
Resignation.

FORREST, THOMAS EDWARD	Mar. 12, 1923
WALKER, FRED BACON	Mar. 12, 1923

ASSOCIATE MEMBERS

ORR, GEORGE	Mar. 12, 1923
SHARP, HOMER J.	Mar. 12, 1923
STUART, EDWARD	Mar. 12, 1923
TERRY, ARTHUR LINVILLE, JR.	Mar. 12, 1923

JUNIORS

CALLAWAY, WILLIAM AYLETT	Mar. 12, 1923
--------------------------------	---------------

Deaths

CLARKE, DAVID DEXTER. Elected Member, July 5, 1882; died March 3, 1923.
HOWELL, WILLIAM AUGUSTUS. Elected Associate Member, April 3, 1907; Member, June 6, 1911; died March 12, 1923.
KENNEY, HARRY WILLEY. Elected Associate Member, January 19, 1920; died March 8, 1923.
KNAP, EDGAR DAY. Elected Junior, December 1, 1896; Associate Member, December 4, 1900; died February 27, 1923.
MCMAB, WILLIAM. Elected Member, December 1, 1908; died February 23, 1923.
MASON, SAMPSON DOUGLAS. Elected Member, October 6, 1886; died March 27, 1923.
PRINDLE, FRANKLIN COGSWELL. Elected Member, March 4, 1874; died March 6, 1923.
TAIT, WILLIAM STUART. Elected Associate Member, May 31, 1916; Member, December 4, 1922; died March 7, 1923.
WATSON, MERRILL. Elected Affiliate, October 7, 1902; date of death unknown.

Total Membership of the Society, April 3, 1923

Members	4 700
Associate Members	5 279
<hr/>	
Corporate Members	9 979
Honorary Members	11
Juniors	514
Affiliates	167
Fellows	9
<hr/>	
Total	10 680

Engineering Societies Employment Service

An Engineering Societies Service Bureau was established December, 1918, as an activity of Engineering Council. It was managed by a board made up of the Secretaries of the four Founder Societies, and funds for its maintenance were provided by these Societies. On January 1, 1921, this Bureau was taken over by The Federated American Engineering Societies and was known as the Employment Service of that organization. Recently, the management of the Service has been taken over by the Founder Societies. A weekly Employment Bulletin, listing the positions available, may be seen at the office of any Secretary of a Local Section. Members of the American Society of Civil Engineers who desire to register should apply for further information, registration forms, etc., to Walter V. Brown, Manager, Engineering Societies Building, 29 West 39th Street, New York City. In order to be included in the list published in *Proceedings*, copy must be received on or before the first of each month. All communications should be addressed to Mr. Brown, giving number of position, name, address, and membership in Engineering Society.

Employment Bulletin

POSITIONS AVAILABLE

DRAFTSMEN DESIGNERS (Mechanical). Must be experienced in oil refinery work. With prominent consulting and construction engineering corporation in New York City. Application by letter stating full details and experience. R-551.

DRAFTSMEN DESIGNERS (Structural). Must be experienced in oil refinery work. With prominent consulting and construction engineering corporation in New York City. Application by letter stating full details and experience. R-552.

CHAINMAN, Maintenance-of-Way Department of railroad. Application by letter. Location, Conn. R-556.

MAN for Copy Department in division for the making up of copy and general layouts. Position gives unlimited opportunity for advancement. It is not an agency and does not operate on agency methods. It is the Advertising Department of the various concerns by which it is employed. We handle technical accounts only, in the machine tool and iron steel fields, and are not interested in a man who is good at writing retail store work, but only in a man who knows his business on layouts, copy, and technical articles dealing with machine tools. Application by letter. Location, Ohio. R-572.

ARCHITECTURAL ENGINEER. Must be capable of designing high-class office buildings, industrial plants, etc. Should be familiar with outside work. Application by letter. Salary not stated. Location, Mass. R-580.

ENGINEER. Must be able to go out and interview clients, good executive, and personality. Familiar with structural and industrial plant layout. Application by letter. Salary not stated. Location, Mass. R-598.

ESTIMATOR familiar with building estimating of all kinds and will develop into cost engineer. Application by letter. Salary not stated. Location, Mass. R-599.

STRUCTURAL STEEL DRAFTSMAN. Single. Application in person. Location, South America. R-603.

STRUCTURAL STEEL DRAFTSMEN (3). Application in person. Location, Texas. R-604.

MEN who have had experience superintending large size railroad shop and round-house construction. Application by letter. Salary not stated. Location, Illinois. R-633.

SALESMAN, to call on contractors, construction companies, and others, mainly in New York and vicinity, for the purpose of selling second-hand or used machinery. Work requires a clean-cut, straightforward man, one who can sell equipment on its merits, without any misrepresentation whatsoever. Application by letter only. Compensation is strictly on a commission basis, and no drawing accounts or salaries will be paid out. Application must give full information regarding applicant, including experience, education, and everything else necessary. Headquarters, New York City. R-650.

CONSTRUCTION ENGINEER for highway, sidewalks, and building construction for Development Company. Investment required. Application by letter. Salary not stated. Location, New Jersey. R-659.

EXPERIENCED WATER TURBINE DESIGNER. Application by letter. Salary not stated. Location, New York City. R-662.

STRUCTURAL STEEL DETAILERS AND CHECKERS, preferably with experience on coal tipples and light structural work. Application by letter. Salary not stated. Location, Illinois. R-663.

TIMBER CONSTRUCTION DRAFTSMEN on wooden tipples, coal, washeries, etc. Application by letter. Salary not stated. Location, Illinois. R-665.

MECHANICAL OR CIVIL ENGINEER, who has worked in an architect's or contractor's and builder's office on drafting preferably. Application by letter. Salary not stated. Location, Connecticut. R-675.

SALES ENGINEER experienced in design and selling industrial drying equipment and with a knowledge of fan and blower systems. Must have technical education and selling experience. Application by letter, giving complete details in first letter, and state salary expected. Location, New York City. R-687.

SALES ENGINEER familiar with heating, ventilating, and pumping equipment. Application in person. Commission and drawing account. Location, New York City. R-689.

COST MAN AND STENOGRAPHER for construction work. Application in person. Location, New Jersey. R-692.

DESIGNER-DRAFTSMEN who have general industrial experience on design, construction, etc. Prefer men who have had experience in pulp and paper industry. Application by letter. Salary not stated. Location, Michigan. R-704.

POWER PLANT DRAFTSMEN. Should be able to lay out in detail complete power plant from start to finish. Application by letter. Location, Illinois. R-716.

MECHANICAL ENGINEER for Assistant Chief Engineer in factory with large machine shop and foundry, manufacturing, rock crushing, grinding, and other mining machinery. Must have this experience. Application by letter giving age, education, and experience in detail. Location, not stated. Salary not stated. R-717.

INSPECTOR for manufacturer's plant on steel-plate work, power-plant equipment. Single, 25 to 30. Application in person. Location not stated. R-734.

MAN experienced in export shipping work to take charge of office handling 100 000 tons of equipment. 30 to 35 years old. Must speak Spanish and know invoice requirement of South American countries. Application in person by appointment. Location, New York City. R-736.

ASSISTANT ENGINEER, on field construction work. To make drawings. Application in person. Location, Honolulu, Hawaii. R-770.

MAN, to supervise some evening classes and also use part of the daytime to prompt these classes. The total number of working hours per week is 48. It is required that this man be a member in good standing of some Evangelical Church. Application in person. Location, New York City. R-776.

STRUCTURAL DRAFTSMAN, preferably college graduate with several years' drafting-room experience. Application by letter. State age, nationality, married or single, salary required, and give experience in detail. Location, Pennsylvania. Anthracite region. R-784.

DRAFTSMAN, with 4 to 6 years' experience on buildings, especially plumbing, lighting, and drainage. Application in person. Salary not stated. Location, New York City. R-795.

ENGINEERING DRAFTSMAN, for design on concrete for buildings. Should have 6 years or more experience. Application in person. Salary not stated. Location, New York City. R-796.

CIVIL ENGINEER, graduate, experienced on writing specifications and estimating along building and mechanical equipment. Application in person. Location, New York City. R-800.

SALES ENGINEER, with mechanical drafting or experienced with stoker and boiler-room equipments. Application by letter. Location, New York City. R-801.

SALES ENGINEER, with heat and ventilation experience. Application by letter. Location, New York City. R-802.

DRAFTSMAN with building construction experience. Practical man who understands making finished drawings. Application in person. Location, New York City. R-812.

STRUCTURAL STEEL DRAFTSMAN for bridge design. Work temporary. Application in person. Location, New York City. R-818.

SALES MANAGER in full charge of the territory which consists of the western half of Pennsylvania, a good portion of West Virginia, and part of Ohio. The position does not require constant traveling, although frequent visits into the territory are necessary. Graduated electrical engineer, preferably practical shop training. Salary and bonus. Application by letter. R-820.

STRUCTURAL STEEL DRAFTSMAN with 3 to 4 years' experience along general building lines. Application in person. Salary not stated. Location, New York City. R-830.

EXPORT SALES ENGINEER with experience in selling iron and steel products abroad. Latin-American experience preferred for service in United States. Application by letter. Salary not stated. Headquarters, Washington, D. C. R-833.

GRADUATE ENGINEER who has extensive sales experience abroad on factory machinery, for responsible position in Asia. Single man preferred. Must be an American citizen. Application by letter. Salary not stated. Location, Asia. R-839.

YOUNG MAN for editorial and research work in connection with market analysis. Statistical experience desirable. Application by letter. Salary not stated. Location, South. R-840.

DETAILERS AND CHECKERS familiar with theatre and office buildings. Application in person. Salary not stated. Location, New Jersey. R-852.

ENGINEERING DRAFTSMEN (2-3). Experienced along elevating and conveying machinery lines if possible. Men with personality to eventually develop into salesmen. Application by letter. Salary not stated. Location, New York State. R-856.

SALESMAN experienced in selling conveying machinery. Application by letter. Salary not stated. Location, New York City. R-857.

RECENT GRADUATE Civil Engineer, for time, material, or job accounting. Experienced accountant not wanted. Application by letter. Salary not stated. Location, New York City. R-859.

CONCRETE DRAFTSMAN. No concrete experience required. Recent graduate considered. Application by letter. Salary not stated. Location, New York City. R-860.

DRAFTSMAN experienced in railroad work: locomotives and cars. Application by letter. Salary not stated. Location, Iowa. R-862.

YOUNG MAN INTERESTED IN CIVIL ENGINEERING as assistant to engineer on construction work. Application in person. Salary not stated. Location, New York City. R-863.

ENGINEERING DRAFTSMEN for State highway work. Application by letter. Salary not stated. Location, New Jersey. R-864.

DRAFTSMAN thoroughly familiar with structural steel designs and details. Application in person. Salary not stated. Location, New Jersey. R-867.

CIVIL ENGINEER. Experience in plain surveying as well as running a level on construction jobs. Experience as structural

draftsman in steel and reinforced concrete and some experience in designing. Would prefer man between 25 and 30 years of age, with a certain amount of engineering education, but do not care particularly whether or not he is a college graduate. Application by letter. Salary depends on qualifications and experience. Location, Pennsylvania. R-881.

FIRST-CLASS DRAFTSMAN on water supply work and civil engineering drawings. Rapid worker and first-class tracer. Application by letter, stating education and experience. Must be a resident of New Jersey. Salary not stated. Location, New Jersey. R-900.

ENGINEER with knowledge of building construction and a great deal of ambition to make a success in a line of work, involving the display of selling ability. Must have a great deal of determination and sufficient confidence in himself to start work on a straight commission basis, with the understanding that the opening holds possibilities for advancement. Such a man to act as District Registrar in Boston District, to call on ambitious men employed in the building industry, and to introduce to them course of Construction Management. Application by letter. Location, Mass. R-905.

STRUCTURAL STEEL DRAFTSMAN with building construction experience for hotels, etc. Application by letter. Salary not stated. Location, Michigan. R-914.

CONCRETE DRAFTSMAN with building construction experience, hotels, etc. Application by letter. Salary not stated. Location, Michigan. R-915.

MEN AVAILABLE

HYDRAULIC ENGINEER, Assoc. M. Am. Soc. C. E.; age 42; graduate in civil engineering of 22 years standing. Several years' experience in design of drainage works and in flood-control investigations; also familiar with cost accounting. Desires position as designer, or cost engineer, or in financial department. Has decided talents of an educational nature that would be of use in promotional capacity. Any location east of Rocky Mountains. Available on short notice. CE-427.

CONCRETE PHYSICIST, Assoc. M. Am. Soc. C. E.; age 42. Specialist in testing and physico-mathematical analysis of concrete mixtures, desires opportunity to exploit special research through large concrete producing agency. CE-428.

CIVIL ENGINEER, M. Am. Soc. C. E.; age 38; married; graduate. Eighteen years' experience wide variety engineering work, both design and construction. Land, coal mine, municipal, and railroad surveys. Railroad, tunnel, and subway construction, hydro-electric work, industrial building design and construction, large machine shop and forge shop operation, sales experience, business education. Now employed, soon free. CE-429.

EXECUTIVE, M. Am. Soc. C. E. Available as general manager, works manager, or supervising engineer for financial, utility, or industrial corporation. Broad experience

in organization, financing, administration, production control, economical operation, cost accounting and analysis. CE-430.

CONSTRUCTION SUPERINTENDENT, M. Am. Soc. C. E.; age 41. Twenty-one years' experience (including three on design, sixteen in responsible charge) construction railway, municipal, and highway bridges, sewers, water-works, mine structures, modern highways, buildings, etc. Two years war work as Expert Construction Engineer, Constructing Quartermaster, Chief Disbursing Officer, Aide to Chief of Staff on Army Program, and Supervising Constructing Quartermaster. Available at once, anywhere. CE-431.

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E.; age 29; unmarried. With nine years' varied experience on engineering and construction work. Desires location with construction company or engineering department of large corporation. Personal interview. CE-432.

STRUCTURAL ENGINEER, Assoc. M. Am. Soc. C. E.; Graduate C. E.; age 38; married. Twenty years' practical experience on designs, estimates, specifications, reports, supervision, and construction; all classes of commercial buildings, power plants and appurtenant structures; new plant developments from original projection to completed construction; water-front structures, retaining walls, heavy and ec-

centric foundations. Specialization; reinforced concrete. Major experience in New York. At present employed by large industrial concern in Middle West on extensive plant development and power plant extension now nearing completion. Desires position requiring supervisory or executive ability. Capable project engineer. In fine health; no physical defects; energetic personality. A-1 references. Correspondence solicited. CE-433.

RESEARCH ENGINEER, trained in civil engineering, chemistry, physics, and mathematics, holds Doctorate degree in engineering, desires connection with industrial concern or university; four years' practical (highway, concrete design, and tunnel) and three years' teaching experience. Location, immaterial. CE-434.

CIVIL ENGINEER; married. Twenty-one years' construction experience: Railroads eight years; street railways, roadways, and tunnels, four years; hydro-electric projects, hollow dams, granite and clay foundations, four years; city buildings, water, sewerage,

disposal plants, two years; private practice, city additions, land surveying, deed descriptions, three years. Desires position. Available July 15th. CE-435.

CONSTRUCTION ENGINEER; Graduate of University of Maine, Class of 1914, for bridge, dam, or highway work. CE-436.

GRADUATE CIVIL ENGINEER of the University of Colorado and Nebraska, desires position for Professor of Civil Engineering, Railway, and Hydraulic Engineering. CE-437.

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E.; 40; married; technical. Seventeen years' experience on miscellaneous engineering and construction work, including designs, heavy earthwork, railroad yards and buildings, etc. Extensive steam and electric railway valuation and maintenance. Now employed in executive position with large utility property. Desires change. Will consider position with railway, industry, or contractor. Personal interview solicited. CE-438.

Additions to Engineering Societies Library*

(From March 1 to March 31, 1923)

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

BIBLIOGRAPHY ON THE PRESERVATION OF FRUIT AND VEGETABLES.

In Transit and Storage. U. S. Department of Agriculture, Library. Wash., 1922. (Purchase.)

BUSINESS LIBRARY CLASSIFICATION WITH INDEX.

By Julia E. Elliott. Chic., 1923. (Purchase.)

INDEXING:

A Handbook of Instruction. By George E. Brown. N. Y., 1921. (Purchase.)

SUBJECT INDEX TO PERIODICALS, 1917-1919:

Pt. K, Science and Technology. Library Association. Lond., 1922. (Purchase.)

ENGINEERING ECONOMICS.

By John C. L. Fish. Second Edition. N. Y. & Lond., McGraw-Hill Book Co., 1923. 311 pp., tab., 9 x 6 in., cloth. \$3.00.

As the table of contents indicates, this book treats of the principles which underlie economic judgment in the business side of engineering. The present edition, which is practically a new text, assumes choice of investment to be the fundamental problem of engineering economics and proceeds to the analysis of this problem in a way that will give the student a working knowledge of the principles involved. Contents: Introduction; Analysis of the Problem of Investment; Interest; Preliminary Analysis of First Cost and of Operation Cost; Practical Analysis of First Cost; Business Units; Irreducible Data of Problem of Investment; Business Statistics; Miscellaneous Forecasts; Valuation; Errors in Estimating; Engineering Reports.

CAPITAL'S DUTY TO THE WAGE-EARNER.

By John Calder. N. Y. & Lond., Longmans, Green & Co., 1923. 326 pp., tab., 8 x 5 in., cloth. \$2.25.

This is a study of the major industrial problems based on an experience in industry extending over nearly forty years. There are chapters on the objections of labor to capitalism, on labor unionism, employers' associations, the "open" and the "closed" shop, shop organization, employees' representation, unemployment and similar questions, in which these matters are discussed and an attempt made to present practical answers. The author directs his book to leaders in industrial undertakings, to whom he appeals for improvement in the handling of the worker.

PRACTICAL FACTORY ADMINISTRATION.

By Matthew Porosky. N. Y. & Lond., McGraw-Hill Book Co., 1923. 244 pp., diagrams, 8 x 5 in., cloth. \$2.50.

The purpose of this book is to present the accepted principles of modern factory administration and to show how they may be effectively applied to actual operating conditions. It is addressed to executives, salesmen, cost accountants, and students of industrial administration. The principles, practices, and forms that it gives, are presented from the point of view of the average rather than the exceptionally large establishment.

AMERICA vs. EUROPE IN INDUSTRY.

By Dwight T. Farnham. N. Y., Ronald Press Co., 1921. 492 pp., illus., diagrams, 9 x 6 in., cloth. \$4.00.

The author of this book spent six months in Europe, during 1920, in an investigation of the industrial situation in France, Germany, Italy, and England. Particular attention was given to methods of administration and organization, to the executive control of production, and to industrial relations. Buildings were studied from the point of view of their suitability for their uses. Special attention was given to mechanical handling systems. Education and such economic and sociological subjects as housing, profit-sharing, and co-operation were studied with respect to their future effect on industry. The results of the investigation, as recorded in this volume, give a picture of the efficiency of manufacturing in Europe to-day.

* Unless otherwise specified, books in this list have been donated by the publishers.

UNDERWRITERS' LABORATORIES:

Report on Interior Building Construction, etc., Jointly Submitted by Associated Metal Lath Manufacturers (Chicago), and National Lumber Manufacturing Association (Chicago). By National Board of Fire Underwriters. 1922. (Purchase.)

HANDBOOK OF CHEMISTRY AND PHYSICS.

By Charles D. Hodgman and Norbert A. Lange. Ninth Edition. Cleveland, Ohio, Chemical Rubber Publishing Co., 1922. 803 pp., tab., 7 x 5 in., fabrikoid. \$4.00.

Nine editions of this collection of physical and chemical data have appeared within nine years, an indication that many persons have found it a convenient work of reference. The book is intended to provide accurate, contemporary information in the fields of chemistry and physics on questions that recur frequently in practice. Many tables have been specially prepared for the book. The new edition has been thoroughly revised and considerably enlarged.

DIMENSIONAL ANALYSIS.

By P. W. Bridgman. New Haven, Yale University Press, 1922. 112 pp., 9 x 6 in., cloth. \$5.00.

The substance of this book was given as a series of lectures to the Graduate Conference in Physics of Harvard University in 1920. The growing use of the methods of dimensional analysis in technical physics, as well as the importance of the method in theoretical physics, make it desirable that every physicist should have it at his command. The lack of any systematic exposition of the principles underlying the method, however, has been an obstacle that Professor Bridgman removes by this book, the first orderly, general exposition of the subject in the English language. His statement of principles is accompanied by many illustrations of their applications, especially chosen to emphasize the points concerning which there is the most common misunderstanding. Some of these deal with important questions of electrical theory, aeronautics and other subjects of interest to engineers.

TEXTBOOK OF PRACTICAL PHYSICS.

By W. Watson. Third Edition. Revised by H. Moss. Lond. & N. Y., Longmans, Green & Co., 1922. 635 pp., diagrams, tab., 8 x 5 in., cloth. \$3.50.

This book is intended as a reference for the student working in a physical laboratory, and describes experiments that can be performed with the ordinary equipment. The aim of the book is to draw attention to those points that require care and to indicate the common sources of error. The experiments are not intended for beginners, but for students who have already worked through a more elementary course of experiments.

DICTIONARY OF APPLIED PHYSICS, Vol. 3.

Meteorology, Metrology, and Measuring Apparatus. By Sir Richard Glazebrook. Lond., Macmillan & Co., 1923. 839 pp., illus., 9 x 6 in., cloth. 63 s. (Gift of Macmillan Co., N. Y.)

This volume of the Dictionary maintains the high standard of excellence shown in the first two volumes. It should be of interest to engineers in all branches of the profession, as it contains accurate scientific data and precise theoretical information on measuring instruments and methods of measurement. Among the important articles are: Surveying Tapes and Wires, by Sydney W. Attwell; Preparation of Quartz Fibers, by Charles V. Boys; Nomography, by Selig Brodetsky; Physics of the Atmosphere, by David Brunt; Measurement of Solar Radiation, by William W. Coblentz; Watches and Chronometers, by E. G. Constable; Design of Scientific Instruments, by Horace Darwin and Cecil C. Mason; Balances, by F. A. Gould; Meters, by Edgar A. Griffiths; Calculating Machines, by Ellice M. Horsburgh; Comparators and Mine Standards of Length, by W. H. Johnson; Combination of Observations, by H. L. Jolly; Mechanical Means of Integration, by Hyman Levy; Weighing Machines, by George A. Owen; Gauges, by Frederick H. Rolt; Clocks and Time-Keeping, by Ralph A. Sampson; Metrology, by John E. Sears, Jr.; Humidity, by Sydney Skinner; Draughting Devices, by Alma Turner; Micrometers, by H. H. Turner; and Atmospheric Electricity, by C. T. R. Wilson. Ample cross-references and a good index are provided, and there are numerous references to other literature on many subjects.

ÉLÉMENTS DE MÉCANIQUE A L'USAGE DES INGÉNIEURS;

Statique Cinématique. By Robert d'Adhémar. Paris, Gauthier-Villars et Cie., 1923. 254 pp., 10 x 6 in., paper. 16 francs.

This textbook reproduces the course of instruction given by the author at the Institut Industriel du Nord de la France. It contains the elements of kinematics and dynamics, and an elementary development of statics.

THERMODYNAMICS AND THE FREE ENERGY OF CHEMICAL SUBSTANCES.

By Gilbert Newton Lewis and Merle Randall. N. Y. & Lond., McGraw-Hill Book Co., 1923. 653 pp., tab., 9 x 6 in., cloth. \$5.00.

The authors have attempted to meet the needs of three classes of readers: First, the beginner who wishes to learn what thermodynamics is and what problems in physics, chemistry, and engineering can be solved by its aid; second, the reader who looks for the philosophical implications of such concepts as energy and entropy; third, the investigator who seeks the specific thermodynamic methods which are applicable to the problem of pure or applied science which he has attacked and the data required for its solution. The book is not a textbook in the ordinary sense of the word, although the authors trust that it will be useful in advanced chemical courses. It is designed rather as an introduction to research and as a guide to any one who wishes to use thermodynamics in productive work.

ANALYTICAL EXPRESSION OF THE RESULTS OF THE THEORY OF SPACE-GROUPS.

By Ralph Walter G. Wyckoff. (Carnegie Institute of Wash. Publication No. 318.) 1922. (Purchase.)

TABLES ANNUELLES DE CONSTANTES ET DONNÉES NUMÉRIQUES DE CHIMIE,

De Physique et de Technologie. Vol. 4, Années 1913-16, Deuxième partie. Paris, Gauthier-Villars et Cie.; Cambridge, Eng., Cambridge Univ. Press; Chicago, Univ. of Chicago Press, 1922. 1377 pp., 11 x 9 in., cloth. \$13.57. (Gift of University of Chicago Press.)

The annual tables of chemical, physical, and technical constants and numerical data are prepared under the direction of the International Research Council and the International Union of Pure and Applied Chemistry, by an International Committee. The aim of the editors is to summarize and present in convenient form for reference the data in its field, which appear in the important periodicals and treatises of each year, and thus supply investigators with the latest results of research. Vol. 1 to 3, issued in 1912, 1913, and 1914, covered the literature of 1910-12. Vol. 4, which has just appeared, covers that from 1913 to 1916, inclusive. Full references to the sources of the data are given.

STUDY OF THE VAPOR PRESSURE OF AQUEOUS SOLUTIONS OF LITHIUM CHLORIDE

At 20° C. By William Herbert Bahlke. Baltimore, Md., 1922. (Purchase.)

THEORY OF SPECTRA AND ATOMIC CONSTITUTION.

By Niels Bohr. Cambridge, University Press, 1922. 126 pp., 9 x 6 in., cloth. \$3.00. (Gift of Macmillan Co., N. Y.)

All three essays deal with the application of the quantum theory to problems of atomic structure, and refer to the different stages in the development of this theory. The first one, "On the Spectrum of Hydrogen", was first published in 1914, when the formal development of the quantum theory was only at its beginning. The second essay, "On the Series Spectra of the Elements", published in 1920, continues the study of the problem and attempts to elucidate it by a general principle which postulates a formal correspondence between the fundamentally different conceptions of the classical electro-dynamics and those of the quantum theory. The third essay, "The Structure of the Atom and the Physical and Chemical Properties of the Elements", appeared in 1921. It contains a survey of previous results concerning atomic problems and an account of the theoretical ideas of the quantum theory, and shows how these ideas lead to a view of atomic constitution which seems to offer an explanation of the observed physical and chemical properties of the elements.

NICKEL.

By F. B. H. White. (Pitman's Common Commodities and Industries.) Lond. & N. Y., Isaac Pitman & Sons, 1923. 118 pp., illus., tab., 7 x 5 in., cloth. \$1.00.

This book gives a brief account of the occurrence of nickel, the methods for recovering and refining it, and the uses of the metal and its alloys. It is written in simple style and intended for readers who are not specialists, but who wish general information.

CATALYSIS IN ORGANIC CHEMISTRY.

By Paul Sabatier. Translated by E. E. Reid. N. Y.; D. Van Nostrand Co., 1922. 406 pp., 9 x 6 in., cloth. \$5.00.

Professor Sabatier has collected from scattered sources a vast amount of information about catalysis, and has brought the facts together in convenient and suggestive form in this volume, interpreting them on the basis of his own investigations on the subject. Extensive footnote references to the original publications form a valuable bibliography on catalysis. The translator has added an article on "Theories of Contact Catalysis", by Professor Bancroft, and name and subject indexes.

PETROLEUM AND ALLIED INDUSTRIES.

By James Kewley. Lond., 1922. (Purchase.)

WATER POWER SITUATION IN NORTH CAROLINA.

By Thorndike Saville. (North Carolina Geological and Economic Survey, Water Resources Division, Circular No. 2.) Chapel Hill, N. C., 1922. (Purchase.)

WATER SUPPLY BULLETIN, No. 1.

Washington (State). Olympia, Wash., 1921. (Purchase.)

PETROLOGY OF THE SEDIMENTARY ROCKS.

By F. H. Hatch and R. H. Rastall. (Textbook of Petrology, v. 2). Lond., 1923. (Purchase.)

FIELD GEOLOGY.

By Frederic H. Lahee. Second Edition. N. Y. & Lond., McGraw-Hill Book Co., 1923. 651 pp., illus., pl., tab., 7 x 5 in., fabrikoid. \$4.00.

This book, treating geology from the field viewpoint, is intended both for a textbook and for a pocket manual for engineers and others interested in geologic problems. An elementary knowledge of general geology is assumed. The first part of the book is concerned with the recognition and interpretation of geologic structures and topographic form. The latter part describes methods of geologic surveying, the construction of maps, sections, etc., the interpretation of maps, the solution of computations and the preparation of reports. The new edition has been thoroughly revised and enlarged.

GEOLOGY OF A PORTION OF THE BADLANDS;

The Paleontology of the Area; the Badlands as a National Park. By Ward, Freeman and W. C. Toepelman. 1922. Vermilion, S. Dak. (Purchase.)

OIL AND GAS FIELDS OF KENTUCKY.

Map. U. S. Geological Survey. 23.9 x 53.8. Wash. (Purchase.)

POSSIBILITIES OF OIL IN WESTERN DEWEY COUNTY.

By Ward, Freeman and Roy A. Wilson. Vermilion, S. Dak., 1922. (Purchase.)

HANDBOOK OF INDIANA GEOLOGY.

By W. N. Logan and others. Indianapolis, 1922. (Purchase.)

FIELD PRACTICE: INSPECTION MANUAL.

By National Fire Protection Association. Second Edition. Bost., 1922. (Purchase.)

TEXTBOOK OF APPLIED MECHANICS:

Vol. 2: Strength of Materials. By Andrew Jamieson. Revised by Ewart S. Andrews. Tenth Edition. Lond., 1922. (Purchase.)

TECHNICAL ANALYSIS OF STEEL AND STEEL WORKS MATERIALS.

By Frank T. Sisco. N. Y. & Lond., McGraw-Hill Book Co., 1923. 543 pp., illus., tab., 9 x 6 in., cloth. \$5.00.

This is a manual of methods for chemists and analysts. The text follows current practice in steel laboratories, presents only the best and most rapid methods, and gives explicit directions for these. One section is devoted to the design, equipment, and operation of works laboratories.

BOTTIN DE LA MÉCANIQUE ET DES INDUSTRIES QUI S'Y RATTACHENT.

Paris, 1922-23. (Purchase.)

STEAM-TURBINE PRINCIPLES AND PRACTICE.

By Terrell Croft. (Power Plant Series.) N. Y. & Lond., McGraw-Hill Book Co., 1923. 347 pp., illus., 8 x 6 in., cloth. \$3.00.

This treatise is intended to provide the operating engineer and the plant superintendent with information required in everyday work. The topics treated are (1) those with which he must be familiar to insure the successful, economical operation of turbines; and (2) those which he must know in order to choose the proper turbines for any class of work. Design is not treated. The book is a clearly written account of steam turbines, written for the user, not for the designer or maker.

DESIGN OF STEAM BOILERS AND PRESSURE VESSELS.

By George B. Haven and George W. Swett. Second Edition. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1923. 435 pp., illus., diagrams, charts, tab., 9 x 6 in., cloth. \$4.00.

This book is intended primarily to teach rational methods of boiler design. At the same time, it is intended to be an introduction to the study of machine design, a purpose for which the authors believe an analysis of the stresses existing in boilers and other pressure vessels

has many advantages. In general, the results herein presented have been obtained by rational rather than empirical methods, the usages of current boiler-making practice having been kept constantly in view. Many graphs and tables are given, which enable numerical results to be obtained without using formulas. The principles are illustrated by their application to the complete practical design of boilers and tanks of six different types.

DROP FORGING AND DROP STAMPING.

By Henry Hayes. (Pitman's Technical Primers.) Lond. & N. Y., Isaac Pitman & Sons, 1923. 108 pp., illus., 6 x 4 in., cloth. 85 cents.

In previous books on drop forging, attention has generally been concentrated on a description of the plant used. A broader treatment has been attempted in this volume, particularly with a view to relating the mechanical with the metallurgical problems. The aim has been to provide an introduction to the equipment and methods of the drop-forge shop, to the principles underlying drop forging, and to the heat treatment and hammer treatment of forgings. The question of dies is also discussed.

INTERIOR WIRING AND SYSTEMS FOR ELECTRIC LIGHT AND POWER SERVICE.

By Arthur L. Cook. Second Edition. N. Y., John Wiley & Sons; Lond., Chapman & Hall, 1923. 458 pp., illus., diagrams tab., 7 x 4 in., fabrikoid. \$3.00.

This book is intended as a guide to modern practice in electric lighting and power applications, and in the design and installation of the wiring for these purposes. It has been written particularly for superintendents of electrical installations and for wiremen who may be called on to extend or change existing installations and who need definite information on the best method of procedure. It is also intended as a textbook for students in trade schools and as a handbook for architects.

LARGE ELECTRIC POWER STATIONS:

Vol. 3: A 130 000-Kilowatt Power Station. By G. Klingenberg. Translated by Oswald Feldmann. Lond., 1923. (Purchase.)

WORKING PRACTICE IN THE DESIGN OF LARGE DOUBLE-ACTING TWO-STROKE Engines. By A. E. L. Chorlton. Lond., 1923. (Purchase.)

INTERNAL COMBUSTION ENGINE:

Vol. 1: Slow Speed Engines. By Harry R. Ricardo, Lond., 1922. (Purchase.)

LEHRBUCH DER EISEN- UND STAHLGIESSEREI.

By Bernhard Osann. Fifth Edition. Leipzig, Wilhelm Engelmann, 1922. 693 pp., illus., diagrams, 10 x 7 in., cloth. 24 marks.

This textbook of foundry practice is intended for beginners in the industry and also as a reference work for those engaged in iron and steel founding. Its popularity is shown by the appearance of five editions within ten years. A concise but comprehensive account of the methods and appliances used is given, which is supplemented by numerous references to the literature and drawings. Special attention is given to moulding methods, materials, and machines. Chapters on steel and malleable castings are included. The volume concludes with a chapter on the "Metallography of Cast Iron".

PROBLEMS IN MACHINE DESIGN.

By O. A. Leutwiler. N. Y. & Lond., McGraw-Hill Book Co., 1923. 133 pp., diagrams, tab., 9 x 6 in., cloth. \$1.50.

This series of isolated problems covering the various parts of the subject of machine design, is intended to supplement those given in textbooks on that subject, and thus to give the student greater familiarity with the application of theory and a better working knowledge of the subject. Almost all the problems have been taken directly from existing machines, so that the student works with actual engineering information.

DESIGN OF MACHINE ELEMENTS.

By James A. Mease and George F. Nordenholt. N. Y. & Lond., McGraw-Hill Book Co., 1923. 237 pp., diagrams, tab., 9 x 6 in., cloth. \$2.50.

Most textbooks on this subject are too comprehensive, in the opinion of the authors, to be suitable for an elementary course. To overcome this difficulty they present the present text which makes no claim to originality of subject-matter, except in the methods of computing gear pitches, but which is new in scope and in its manner of presentation. The book is the outgrowth of notes originally prepared by Professor P. B. de Schweinitz for use at Lehigh University.

MECHANICAL TESTING:

Vol. 2: Testing of Prime Movers, Machines, Structures, and Engineering Apparatus. By R. G. Batson and J. H. Hyde. Lond., 1922. (Purchase.)

FLEXIBLE SHAFTS AND TOOLS FOR GRINDING, REAMING, POLISHING, DRILLING, ETC.
(Trade Catalogs). Chicago Flexible Shaft Company. Chic., 1922.
(Purchase.)

TOOL ENGINEERING. FIXTURES FOR TURNING, BORING, AND GRINDING.

By Albert A. Dowd and F. W. Curtis. N. Y. & Lond., McGraw-Hill Book Co., 1923. 340 pp., diagrams, 9 x 6 in., cloth. \$3.50.

The first volume of this series dealt with the design of jigs and fixtures. The present volume discusses the factors that affect the design of tools and fixtures for turning, boring, and grinding. Fundamental points in design are treated and the reasons why certain things are done are explained in detail.

MACHINE TOOLS AND THEIR OPERATION.

By Fred H. Colvin and Frank A. Stanley. N. Y. & Lond., McGraw-Hill Book Co., 1922. 2 v., illus., diagrams, tab., 9 x 6 in., cloth. \$8.00.

This textbook is intended to give the mechanic an understanding of the principles involved in the operation of the ordinary machine tools, and thus enable him to adapt them to the various jobs that occur in the shop. Special attention is given to such subjects as cutting speed, clearance, angles, chip clearance, lubrication, speed and feed, and tool supports. The language used is clear, simple, and non-mathematical.

ACCURATE TOOL WORK.

By C. L. Goodrich and F. A. Stanley. Second Edition. N. Y. & Lond., McGraw-Hill Book Co., 1923. 300 pp., illus., diagrams, 9 x 6 in., cloth. \$3.00.

The text is made up of a collection of articles written by the authors or selected from the *American Machinist*, which discuss practically, methods and devices for producing accurate, interchangeable machine parts.

AMERICA IN SPITSBERGEN; THE ROMANCE OF AN ARCTIC COAL-MINE.

By Nathan Haskell Dole. Bost., Marshall Jones Co., 1922. 2 v., illus., port., 10 x 6 in., cloth. \$25.00.

The main object of this book is to relate in full detail the history of a great coal-mine, established and brought to a paying basis on the Island of West Spitsbergen through the enterprise of two Americans. The history is a romance. The Arctic Coal Company, organized by Messrs. John Munro Longyear and Frederick Ayer, existed from 1905 to 1918, when the properties were sold to Norwegian interests. Mr. Dole has woven the records of the company and the accounts of Spitsbergen by other hands into an interesting account of a mining enterprise carried on under extraordinary conditions, where unusual handicaps of climate, labor, and political intrigue were met and surmounted. His attractive narrative is published in two volumes, illustrated by many photographs.

ANNUAL REPORT 1st, 1921.

Great Britain Mines Department. Lond., 1922. (Purchase.)

ENGINEERING OF EXCAVATION.

By George B. Massey. N. Y., John Wiley & Sons, Lond., Chapman & Hall, 1923. 376 pp., illus., diagrams, tab., 9 x 6 in., cloth. \$6.00.

The writer of this treatise, after spending practically all his time since 1899 in the study of excavating problems and the application of machinery to them, has brought together the fruits of his experience. The book describes present methods of excavating and the machines and other equipment used in excavating and transporting on land and under water. Capacities are given and the machines suited for various kinds of work are indicated.

CAR BUILDERS' CYCLOPEDIA, 1922.

Tenth Edition. Locomotive Cyclopedia, 1922. Sixth Edition. N. Y., Simmons-Boardman Publishing Co., 1922. Nearly 1 200 pp., per volume, illus., diagrams, 12 x 9 in., cloth. \$8.00 per volume.

These two works have long been valued for the definite, thorough description of current American practice in the construction and repair of railroad rolling stock which they present. Each opens with a dictionary of the terms used, following this by a series of chapters which present drawings and photographs of contemporary equipment of all kinds, with brief descriptive articles on development and present practice. Specifications of the American Railway Association, Government regulations, and safety rules are given. The present editions offer the text in a new arrangement, by which the information on each broad topic is collected in one chapter, instead of being scattered through the book under specific headings, as in previous editions. The new arrangement, it is thought, will facilitate reference to the books.

REPORT OF GEORGIA HARBOR, PORT AND TERMINAL COMMISSION

On a State Port Terminal Project at Savannah. By Frederick W. Cowie. Atlanta, July 15, 1922. (Purchase.)

MISSISSIPPI VALLEY FLOOD PROTECTION.

Hearings, December 11-14, 1922. U. S. Congress (House), Flood Control Committee. (Purchase.)

PROTECTION AND DEVELOPMENT OF LOWER COLORADO RIVER BASIN.

Hearings on H. R. 11449, U. S. Congress (House), Irrigation of Arid Lands Committee, June 22-28, 1922. Pts. 3, 4, and 5, and Appendix. Wash. (Purchase.)

MODERN MOTOR CAR PRACTICE.

Edited by W. H. Berry. (Oxford Technical Publications.) Lond., Henry Frowde & Hodder & Stoughton, 1921. 582 pp., illus., 9 x 6 in., cloth. \$10.50. (Gift of Oxford University Press. American Branch.)

This work, the result of the collaboration of a number of prominent English authorities on automobile engineering, is a valuable record of contemporary motor car practice. An account is given of present methods of design and construction of each part of the automobile, with some review of the way in which present forms have developed, of the advantages and disadvantages of various designs, and of the trend of future change. Written in an interesting style and well illustrated, the book should prove of use to designers and manufacturers, and also to owners.

HIGH COST OF GASOLINE AND OTHER PETROLEUM PRODUCTS.

Hearings of U. S. Senate Committee on Manufactures, Pursuant to Senate Resolution 295, Amending Senate Resolution 292, August 7-10, 1922. Wash. (Purchase.)

BRASSEY'S NAVAL AND SHIPPING ANNUAL, 1923.

Lond. (Purchase.)

RAILROAD FREIGHT TRANSPORTATION.

By L. F. Loree. N. Y. & Lond., D. Appleton & Co., 1922. 771 pp., illus., diagrams, map, 8 x 5 in., cloth. \$5.00.

All the functions of a railroad arise from and focus in transportation. As they have become highly specialized, the functions of each department have found exposition in many books. No book has been written, however, that is, immediately concerned with transportation, the reason for the existence of the railroads. It is the purpose of this book to assemble in reasoned order all the phases of loading, distribution of cars, movement of engines and trains, handling of men, the features of permanent way and shop plant, the organization through which they are controlled, and the accounting made of their activities—as they are related to transportation. It is concerned with all that enters into freight transportation.

GLUE AND GELATIN.

By Jerome Alexander. (American Chemical Society. Monograph Series.) N. Y., Chemical Catalog Co., 1923. 236 pp., 9 x 6 in., cloth. \$3.00.

The manufacture of glue and gelatin is important not only because of its magnitude, but also because these products are essential to the production of many others. Furthermore, glue and gelatin have been used in numberless investigations into the nature of colloids, resulting in an embarrassing wealth of publications. This monograph reviews the state of present knowledge of glue and gelatin. Theoretical questions are given particular consideration, but space is also devoted to technical matters, including manufacture, grading, and uses, particular stress being placed on the principles involved.

FABRICATION DE L'ACIER AU FOUR MARTIN.

By Alphonse Barberot. Paris, 1923. (Purchase.)

RECOVERY OF ELASTICITY BY IRON AND STEEL AFTER OVERSTRAIN.

(Report No. 54.) Great Britain Research Department, Woolwich, Lond., 1922. (Purchase.)

METALS AND THEIR ALLOYS.

By Charles Vickers. N. Y., Henry Carey Baird & Co., 1923. 767 pp., illus., tab., 9 x 6 in., cloth. \$7.50.

This work is based on Brann't's well-known work, "Metallic Alloys", but the text has been so enlarged and so thoroughly revised that a new book has resulted. The book is intended to furnish modern, practical information on the composition and properties of industrial metals and their alloys, and on their manufacture, casting, and working. The needs of the foundryman have been kept especially in view.

BRIQUETTING.

By Albert L. Stillman. Easton, Pa., Chemical Publishing Co., 1923. 466 pp., illus., 9 x 6 in., cloth. \$6.00.

This is the first American work on the subject of briquetting, and is based, the author states, on many years' experience. The book opens with an account of the raw materials, which is followed by a chapter on briquette presses. Succeeding chapters describe the methods for briquetting various materials, such as steel swarf and turnings, cast-iron borings, non-ferrous metals, wood waste, peat, lignite, coals, flue dusts and ores. Binders are also discussed. Bibliographies and lists of patents on each subject are given.

DER EISENBAHNBAU.

By Carl Guillery. X. Kapitel, Zweite Abteilung. Heizung und Lüftung der Bahnhofshochbauten. Leipzig, Wilhelm Engelmann, 1922. (Handbuch der Ingenieurwissenschaften, v. 5.) 135 pp., pl., diagrams, 10 x 7 in., cloth. 11 marks.

The present book is a chapter of the fifth volume of the section of the well-known "Handbuch der Ingenieurwissenschaften" which treats of railroad structures, and is concerned with the heating and ventilation of large railroad stations. It avoids competition with the treatises that discuss the scientific problems of heating and ventilation by confining itself to the presentation in a convenient form of the data needed by the builder and structural engineer responsible for the installation of the heating and ventilating plant in a station building. Complicated discussions of theories are avoided, as well as great detail concerning matters common to all heating installations. There are numerous references to the original sources of the information.

MY LIFE AND WORK.

By Henry Ford. N. Y., Doubleday, Page & Co., 1923. 289 pp., 10 x 6 in., cloth. \$3.50.

The story of Henry Ford's industrial life and of the development of the Ford Motor Company is related in this book. It also presents Mr. Ford's general philosophy of life, especially his theories on economic, social, and political topics.

BIOGRAPHICAL DIRECTORY OF RAILWAY OFFICIALS OF AMERICA, 1922.

N. Y., Simmons-Boardman Publishing Co., 1922. 717 pp., 9 x 6 in., cloth. \$6.00.

The 1922 edition of the Biographical Directory is the first edition since 1913. It includes, in alphabetical arrangement, concise professional records of more than 5 000 railroad officials, revised to September 15, 1922. Only 37% of these appeared in the 1913 edition, and only 13% hold the same positions that they held nine years ago.

WER IST'S?

Vol. 8. Leipzig. 1922. (Purchase.)

WHO'S WHO IN ENGINEERING, 1923.

Edited by John E. Sears. Lond. (Purchase.)

Current Civil Engineering Literature

Key to Abbreviated References to Publications Indexed*

Abbreviated References.	Publication.	Place.
Am. C. Inst.....	American Concrete Institute, Proceedings (Y.)	Detroit
A. I. E. E.....	American Institute of Electrical Engineers, Journal (M.)	New York
A. R. E. A.....	American Railway Engineering Association, Proceedings (Y.)	Chicago
A. S. T. M.....	American Society for Testing Materials, Proceedings (Y.)	Philadelphia
Am. Soc. C. E.....	American Society of Civil Engineers, Proceedings (M.)	New York
Am. Soc. Mun. Impvts..	American Society for Municipal Improvements, Proceedings (Y.)	New York
Am. W. W. Assoc.....	American Waterworks Association, Journal (BI-M.)	Baltimore
Am. Wood Pres. Assoc..	American Wood Preservers Association, Proceedings (Y.)	Baltimore
Ann. P. et C.....	Annales des Ponts et Chaussées (BI-M.)	Paris
Ann. T. P. Belg.....	Annales des Travaux Publics de Belgique (BI-M.)	Brussels
Assoc. Ing. Gand.....	Annales de l'Association des Ingénieurs sortis des Ecoles Spéciales de Gand (Q.)	Ghent
Bost. Soc. C. E.....	Boston Society of Civil Engineers, Journal (M.)	Boston
Can. Engr.....	Canadian Engineer (W.)	Toronto
Cem. Eng.....	Cement and Engineering News (M.)	Chicago
Cornell C. E.....	Cornell Civil Engineer (M.)	Ithaca
Dock & Harbour.....	Dock and Harbour Authority (M.)	London
Eisenbau.....	Der Eisenbau (M.)	Leipzig
Eng.....	Engineering (W.)	London
Eng. & Contr.....	Engineering and Contracting (W.)	Chicago
Eng. Inst. Can.....	Engineering Institute of Canada, Journal (M.)	Montreal
Eng. N. R.....	Engineering News-Record (W.)	New York
Engrs. Soc. Pa.....	Engineers' Society of Pennsylvania, Journal (M.)	Harrisburg
Engrs. Soc. W. Pa.....	Engineers' Society of Western Pennsylvania, Journal (M.)	Pittsburgh
Engr.....	Engineer (W.)	London
Engrs. & Eng.....	Engineers and Engineering, Engineers' Club of Philadelphia (M.)	Philadelphia
Gen. Civ.....	Le Génie Civil (W.)	Paris
Gesund. Ing.....	Gesundheits Ingenieur (W.)	Munich
Inst. C. E.....	Institution of Civil Engineers Minutes of Proceedings (Q.)	London
Inst. Mun. & Co. Engrs..	Institution of Municipal and County Engineers, Journal (W.)	London
Int. Ry. Cong. Assoc....	International Railway Congress Association, Bulletin (M.)	Brussels
Land. Arch.....	Landscape Architecture (M.)	Harrisburg
Mech. Eng.....	Mechanical Engineering (M.) Journal of the American Society of Mechanical Engineers	New York
Mil. Engr.....	Military Engineer (M.)	Washington
Min. & Metal.....	Mining and Metallurgy (M.) American Institute of Mining Engineers	New York
Mun. & Co. Eng.....	Municipal and County Engineering (M.)	Indianapolis
N. E. W. W. Assoc.....	New England Water Works Association, Journal (M.)	Boston
N. Y. R. R. Club.....	New York Railroad Club, Proceedings (M.)	Brooklyn
Oest. Ing. Arch. Ver....	Oesterreichischer Ingenieur und Architekten Verein, Zeitschrift (W.)	Vienna
Power.....	Power (W.)	New York
Rev. Gen.....	Revue Générale des Chemins de Fer (M.)	Paris
Ry. Age.....	Railway Age (W.)	New York
Ry. Eng. & Main.....	Railway Engineering and Maintenance (M.)	Chicago
Ry. Rev.....	Railway Review (W.)	Chicago
Schw. Bauz.....	Schweizerische Bauzeitung (W.)	Zurich
Sci. Am.....	Scientific American (M.)	New York
Soc. Ing. Civ. Fr.....	Société des Ingénieurs Civils de France, Mémoires et Comptes Rendus (Q.)	Paris
Ver. deu. Ing.....	Verein deutscher Ingenieure, Zeitschrift (W.)	Berlin
West. Ry. Club.....	Western Railway Club, Proceedings (M.)	Chicago
West. Soc. Engrs.....	Western Society of Engineers, Journal (M.)	Chicago
Zeit. Bau.....	Zeitschrift für Bauwesen (Q.)	Berlin
Z. d. Bauver.....	Zentralblatt der Bauverwaltung (Semi-Weekly)	Berlin

* Y = Yearly; Q = Quarterly; M = Monthly; F = Fortnightly; W = Weekly.

A. Applied Sciences**a. Processes of Calculation****2. Graphical and Nomographical Processes**

How to Develop Cost Curves for Building Estimates.* O. G. Wilbur. Eng. N. R. Feb. 15, '23.

B. Applied Mechanics**a. Mechanics of Solids (Strength of Materials)****2. Elastic Solids**

The Elasticity of Pipe Bends.* Sabin Crocker and S. S. Sanford. Mech. Eng. Mar., '23.

7. Pulverulent Masses (Earth Pressure)

A Brief Description of the Cellular Type of Retaining Wall Used for Holding Embankments.*

G. Wallace Callahan. Cem. Eng. Feb., '23.

The Stability of Quay Walls.* W. Y. Chamberlain. Dock & Harbour Serial beginning Feb., '23.

b. Hydraulics**2. Physical Hydraulics**

Eine neue Vertikalgeschwindigkeitskurve in strömendem Wasser.* (A New Vertical Velocity Curve in Flowing Water.) Michael Welikanoff. Z. d. Bauver. Jan. 31, '23.

Flow of Water Through Spiral Riveted Steel Pipes.* E. Parry. Eng. Mar. 2, '23.

3. Industrial Hydraulics

Turbo-Centrifugal Pumps.* C. R. Waller. Am. W. W. Assoc. Jan., '23.

Foundation and Scour Protection of Large Power Station on Mississippi River.* Eng. N. R. Feb. 1, '23.

Die Transportanlagen zum Bau der Staumauer für das Barberine-Kraftwerk der S. B. B.* (Transport Plant for Building the Dam Wall for the Barberine Power Plant of the S. B. B.)

A. Oehler. Schw. Bauz. Serial beginning Feb. 10, '23.

Chief Characteristics of Centrifugal Pumps.* Robert W. Angus. Can. Engr. Feb. 13, '23.

Derivation of Hydraulic Equation for Gauge Relations and Discharges.* D. K. C. Strathearn. Can. Engr. Mar. 20, '23.

Harnessing California's Waters.* Charles W. Geiger. Sci. Am. Apr., '23.

Tiny Air Bubbles and Giant Dams.* S. G. Roberts. Sci. Am. Apr., '23.

La Nouvelle Usine Hydro-Electrique du Niagara à Queenstown (Canada).* (The New

Niagara Hydroelectric Plant at Queenstown (Canada). Paul Calfas. Gen. Civ. Jan. 29, '23.

Wasserkraftgewinnung aus Flachlandflüssen.* (Winning Water Power from Rivers in Level

Countries.) Rudolf Siefert. Ver. deu. Ing. Serial beginning Jan. 20, '23.

Auswertung der Kennlinien von Francis-Turbinen.* (Valuation of the Characteristic Curves

of Francis Turbines.) R. Müller. Ver. deu. Ing. Jan. 20, '23.

c. Pneumatics**2. Physical Pneumatics**

Wind Pressure in Chimney Design. W. Wallace Christie. Power Mar. 20, '23.

3. Industrial Pneumatics

Coal Handling Installation at Baltimore, U. S. A.* G. E. Titcomb. Dock & Harbour

Feb., '23.

Leakage Through Thin Clearance Spaces.* Edgar Buckingham. Eng. Feb. 23, '23.

L'Utilisation de la force motrice des marées.* (Utilization of the Motive Power of Tides.)

Marc Girod. Schw. Bauz. Feb. 17, '23.

C. Materials of Construction and General Processes**a. Lime, Cement, Mortar, Concrete, Brick, Bitumen, Timber, Gravel, etc.**

A Notable Achievement in Crushing Plant Construction.* Cem. Eng. Mar., '23.

Electric Crushing and Screening Plant at Quarry.* Eng. N. R. Mar. 1, '23.

Gefüge und Wärmeleitvermögen feuerfester Steine.* (Structure and Thermal Conductivity

of Refractory Stone.) Max Jakob. Ver. deu. Ing. Feb. 10, '23.

b. Metals

Schwingungsbeanspruchung und Rissbildung insbesondere von Konstruktionsstählen.* (Vibration Strains and Crack Formation, Especially in Structural Steel.) O. Föppl. Oest. Ing.

Arch. Ver. Feb. 24, '23.

Das Verhalten der Metalle bei wiederholter Beanspruchung.* (The Behavior of Metals under

Repeated Strains.) P. Ludwik and R. Scheu. Ver. deu. Ing. Feb. 10, '23.

c. Preservation and Use of Materials. Painting, Waterproofing

The Corrosion of Underground Structures.* E. R. Shepard. Mun. & Co. Eng. Feb., '23.

f. Rock Excavation. Mining. Rock Removal

Abstracts of Institute Papers. Min. & Metal. Feb., '23.

Cartridge Diameter and Strength of High Explosives.* Spencer P. Howell and J. E. Crewshaw. (From Bureau of Mines Report of Investigations.) Eng. & Contr. Feb. 21, '23.

Abstracts of Institute Papers. Min. & Metal. Mar., '23.

Blasting at Bethlehem.* Cem. Eng. Mar., '23.

g. Execution of Works. Specifications

2. Of Concrete

Experience with Metal Forms for a Flat Slab-Floor.* Dan Patch. Eng. N. R. Feb. 15, '23.
Lining a Power Ditch While in Service.* Eng. N. R. Feb. 22, '23.

Outdoor Swimming Pool, Riverside Park, Edmonton.* R. J. Gibb. Can. Engr. Mar. 20, '23.

3. Of Wood

Neuartige Fachwerkhäuser.* (Modern Frame Houses.) Wahl. Z. d. Bauver. Jan. 17, '23.

5. Of Reinforced Concrete

Tests of I-Beams Encased in Concrete.* Can. Engr. Feb. 27, '23.

Instructions Relating to Reinforced Concrete Structures. (Pub. by Belgian Standardization Assoc.) Int. Ry. Cong. Assoc. Mar., '23.

Method of Constructing Reinforced Concrete Water Tank at Barnum, Minn. W. S. Hewett. (Extracts from paper read before Iowa Eng. Soc.) Eng. & Contr. Feb. 7, '23.

Le Plancher Tronconique en Béton Armé sous la Scène Tournante de Grand-Théâtre de Lyon.* (The Truncated Floor of Reinforced Concrete Under the Revolving Stage of the Lyons Grand Theatre.) Gen. Civ. Feb. 24, '23.

h. Foundations

j. Piles and Pile-Driving

Driving 250-ft. Piles for Hudson River Tunnel Shaft.* Eng. N. R. Feb. 8, '23.

Rock Boring Mollusks Attack Concrete Pile Jackets.* C. A. Kofoid and Robert C. Miller. (From Report of San Francisco Bay Marine Piling Comm. to Am. Wood Preservers Assoc.) Eng. N. R. Mar. 15, '23.

k. Tunnels and Tunneling-Shields

Ventilating a Vehicular Tunnel.* Charles Frederick Carter. Sci. Am. Mar., '23.

World's Longest Continuous Tunnel Holed Through.* Eng. N. R. Mar. 8, '23.
The Shandaken Tunnel.* G. E. Hines. (From Stone & Webster Journal.) Eng. & Contr. Mar. 14, '23.

La Démolition du Tunnel des Batignolles, près de la Gare Saint-Lazare, à Paris.* (Destruction of the Batignolles Tunnel, near the Saint Lazare Station, Paris.) P. Calfas. Gen. Civ. Feb. 10, '23.

D. Highways

c. Construction

Road Grading Costs Reduced by Tractor Hauling.* E. R. Wiggins. Eng. N. R. Feb. 1, '23.
What the Arlington Investigations are Showing.* A. T. Goldbeck. (Paper read before Am. Road Builders' Assoc.) Eng. & Contr. Feb. 7, '23.

Grades for Asphalt Pavements and Remedies for Creeping. Monroe L. Patzig. (Paper read before Iowa Eng. Soc.) Eng. & Contr. Feb. 7, '23.

Proper Design of Highway Subgrade.* Charles Upham. (Paper read before Am. Road Builders' Assoc.) Eng. & Contr. Feb. 7, '23.

Use of Local Material for Concrete Aggregate.* H. J. Kuelling. (Paper read before Am. Road Builders' Assoc.) Eng. & Contr. Feb. 7, '23.

Finished Road Grades Produced by Tractor Outfits.* J. R. McLean. Eng. N. R. Feb. 15, '23.

Recent British Concrete Road Practice.* Johnstone-Taylor. Eng. N. R. Mar. 1, '23.

L'Urbanisme en Allemagne. Les Revêtements des Chaussées.* (Urbanism in Germany. Road Surfaces.) Georges Mesnard. Gen. Civ. Feb. 24, '23.

d. Maintenance

Preparation of Stone and Gravel for Road Maintenance. A. H. Hinkle. (Paper read before Purdue Road School.) Mun. & Co. Eng. Feb., '23.

Tile Drainage of Highways in Iowa. J. L. Parsons. (Paper read before Iowa Eng. Soc.) Mun. & Co. Eng. Feb., '23.

Salvage and Maintenance of Macadam Roads—Practice in Pennsylvania. W. A. Van Duzer. Eng. & Contr. Feb. 7, '23.

Salvage and Maintenance of Macadam Roads. Alex. W. Muir. Eng. & Contr. Feb. 7, '23.

Modern Developments in Methods of Maintaining Bituminous Pavements. B. C. Tiney. (Paper read before Highway Eng. Conference Univ. of Michigan.) Can. Engr. Feb. 27, '23.

Use and Abuse of Highways. T. J. Wasser. (Paper read before Am. Good Roads Cong.) Can. Engr. Feb. 27, '23.

Recent Developments in Concrete Pavement Maintenance.* Leroy C. Smith. (Paper read before Univ. of Michigan.) Eng. & Contr. Mar. 7, '23.

Methods of Maintaining Bituminous Pavements. B. C. Tiney. (Paper read before Univ. of Michigan.) Eng. & Contr. Mar. 7, '23.

Verkehrsverbesserungen an der "Gefangenpforte" im Haag.* (Traffic Improvements at the "Prisoners' Gate" in the Hague.) Z. d. Bauver. Jan. 17, '23.

g. Machinery and Tools

Mechanical Labor Saving Devices in Road Work. W. S. Cumming. (Paper read before Univ. of Michigan.) Eng. & Contr. Mar. 7, '23.

h. Vehicles. Automobiles. Traffic

Speeding Up Traffic at Street Intersections.* Herbert S. Swan. Eng. N. R. Mar. 1, '23.

x. Miscellaneous

Winter Road Work. John H. Mullen. (Paper read before Am. Road Builders' Assoc.) Mun. & Co. Eng. Feb., '23.

The Use and Abuse of Highways. T. J. Wasser. (Paper read before Am. Road Builders' Assoc.) Mun. & Co. Eng. Feb., '23.

E. Bridges, Viaducts, and Arches**a. Timber Bridges and Viaducts**

Force-Account Bridge Building in South Dakota.* Eng. N. R. Feb. 15, '23.

b. Iron or Steel Bridges and Viaducts

The Suldbach Railway Bridge Tests.* (From *The Railway Engineer*.) Eng. & Contr. Jan. 31, '23.

Long-Span Steel Arch Bridge Over Niagara Gorge for Michigan Central R. R.* Eng. N. R. Mar. 1, '23.

Bridging the Tanana River on the Alaska Railroad.* Frederick Mears. Eng. N. R. Mar. 15, '23.

Calcul de l'Arc à Deux Rotules et à Bielle Intermédiaire, c'est-à-dire de l'Arc Continu sur Trois Appuis.* (Calculation of the Arch with Two Joints and with an Intermediate Strut, that is to say of the Continuous Arch on Three Supports.) Gen. Civ. Serial beginning Jan. 20, '23.

d. Concrete and Reinforced Concrete Bridges and Viaducts

Fountain County's Bridge Over the Wabash River at Attica, Indiana.* Cem. Eng. Feb., '23.

Concrete Arch Rib Falls Due to Laitance at Joint.* (From Report of Am. Assoc. Engrs.) Eng. N. R. Feb. 22, '23.

New Bridge Constructed on Old Structure.* (From *Miami Conservancy Bulletin*.) Eng. & Contr. Feb. 28, '23.

Design of Reinforced Steel Concrete Continuous Girder Bridge at Beloit, Wis.* Cem. Eng. Mar., '23.

x. Miscellaneous

Highway Bridge Conditions in Massachusetts. William F. Williams. Mun. & Co. Eng. Feb., '23.

F. Inland Waters**b. Canals (General Articles)**

The New Orleans Navigation Canal.* J. H. Walsh. (Paper read before Am. Assoc. of Port Authorities.) Dock & Harbour Mar., '23.

Der Donau-Main-Kanal.* (The Danube-Main Canal.) Rudolf Halter. Oest. Ing. Arch. Ver. Feb. 9, '23.

c. Regulation of Waterways—Volume of Discharge, Freshets, Floods, Soundings

Stream-Flow Measurements Under Tidal Influence.* E. A. Bailey. Eng. N. R. Feb. 22, '23.

g. Consolidation of Banks, Leakage, etc.

Wire and Willow Mat Revetment on the Missouri River.* Eng. N. R. Feb. 8, '23.

Taking the Kinks Out of Our Rivers.* Ivan E. Houk. Sci. Am. Apr., '23.

j. River and Lake Ports, Equipment

New Landing Stage and Wharf at Gosport.* Engr. Feb. 16, '23.

Reinforced Concrete Pier at Shellhaven.* Eng. Mar. 16, '23.

Modern Freight Pier of the Erie R. R. at Weehawken, N. J.* Ry. Rev. Mar. 17, '23.

G. Maritime Works**c. Vessels and Maritime Navigation. Lighthouses and Buoys. Various Signals**

Schlachtschiff, Unterseeboot, Luftfahrzeug. (Battleship, Submarine, Airship). W. Laudahn. Ver. deu. Ing. Serial beginning Feb. 10, '23.

g. Dredges and Dredging. Force Pumps. Refloating and Removing Wrecks. Ice-Breakers

New Method of Salvage by Compressed Air.* Sci. Am. Mar., '23.

h. Wharves. Mooring Buoys. Harbor Equipment

The Dock System of Bremen: A Modernized German Port.* Herr Tillman and Herr Hacker. Dock & Harbour Mar., '23.

i. Harbors (General Articles)

The Development of a Chilean Port.* Eduardo Reyes Cox. Dock & Harbour Feb., '23.

Le Porte de Dantzig. Description Générale. Développement du Trafic.* (The Port of Danzig. General Description. Development of the Traffic.) B. Nagorski. Gen. Civ. Feb. 17, '23.

H. Railroads. Street and Interurban Railways. Automobiles. Aeronautics**a. Railroads****1. General Articles**

Railway Operating Methods in Argentina.* Herbert Ashton. Ry. Age Feb. 10, '23.

Atocha-Villazon Railway Under Construction in Bolivia.* Paul C. Campbell. Ry. Rev. Feb. 10, '23.

- How the Lehigh Valley Gets More Work with Less Men.* G. L. Moore. Ry. Eng. & Main. Mar., '23.
- Die Entwicklung der japanischen Eisenbahnen vor und nach der Verstaatlichung.* (The Development of the Japanese Railroads before and after Their Acquisition by the State.) Baltzer. Z. d. Bauver. Serial beginning Jan. 31, '23.
- 3. Roadbed (Construction Work)**
- Notes on Testing Ballast by Professor K. Spacek's Method.* H. Deyl. Int. Ry. Cong. Assoc. Feb., '23.
- Reducing the Cost of Building Right of Way Fences.* F. H. C. Graves. Ry. Eng. & Main. Mar., '23.
- Grade Reduction and Widening on Illinois Central R. R.* Eng. N. R. Mar. 8, '23.
- 4. Track**
- Note on the Maintenance and Supervision of the Track. H. Deyl. Int. Ry. Cong. Assoc. Feb., '23.
- Note on the Organization of the Maintenance of Permanent Way on the Local Line from Blois to Villefranche-sur-Cher. Albagnac. Int. Ry. Cong. Assoc. Feb., '23.
- Note on the Question of the Construction of the Road Bed and of the Track.* L. Marczeni. Int. Ry. Cong. Assoc. Feb., '23.
- On the Question of the Road Bed and of the Track. E. F. C. Trench. Int. Ry. Cong. Assoc. Feb., '23.
- The Creosote Treatment of Sleepers. W. Kynoch and J. A. Coderre. Engr. Feb. 9, '23.
- Track Elevation of the D. L. & W. R. R. at East Orange, N. J.* Ry. Rev. Feb. 24, '23.
- Opportunities for Further Development of Labor-Saving Devices. Ry. Eng. & Main. Mar., '23.
- Creosote Shortage Threatens Wood Preservation.* C. M. Taylor. Ry. Age Mar. 3, '23.
- Further Track Test Data: Rail Stresses and Track Distortion on Curves.* Eng. N. R. Mar. 8, '23.
- Developments in Railway Maintenance-of-Way Methods. E. E. R. Tratman. Eng. N. R. Mar. 8, '23.
- 5. Signals and Safety Apparatus**
- Signaling Increases Capacity of Three Tracks.* Ry. Age. Mar. 3, '23.
- Route Signaling at Winchester, Great Western Railway.* Engr. Mar. 9, '23.
- How Automatic Train Control Affects Operation.* F. L. Dodgson. (From paper read before Central Ry. Club.) Ry. Age. Mar. 10, '23.
- Nouveau Mode de Protection des Trains sous les Tunnels de Batignolles et de Meudon.* (New Method of Protecting Trains in the Batignolles and Meudon Tunnels.) J. Netter. Gen. Civ. Feb. 3, '23.
- 6. Rolling Stock (Locomotives, Cars)**
- New Booster Suspension and Locomotive Trailing Truck.* Ry. Rev. Feb. 3, '23.
- Most Powerful Mikados on the Lackawanna Railroad.* Ry. Rev. Feb. 17, '23.
- Design and Performance of Locomotive Feed Water Purifiers.* Desider Ledacs Kiss. Ry. Rev. Feb. 24, '23.
- Automatic Mechanical Couplers for the Indian (Broad Gauge) Railways.* A. M. Bell. Int. Ry. Cong. Assoc. Mar., '23.
- The Ljungström Turbine Locomotive for the Swedish State Railways.* Int. Ry. Cong. Assoc. Mar., '23.
- Advantages of the Spherical Type Roller Bearing.* H. E. Brunner. Ry. Age Mar. 3, '23.
- Underframe and Truck Design for C. M. & St. P. Ry. Cars.* Ry. Rev. Mar. 3, '23.
- Condensing and Utilisation of Exhaust Steam in Locomotives.* Engr. Serial beginning Mar. 16, '23.
- Nouveau Type de Transmission par Bielles pour Locomotives Electriques.* (New Type of Transmission by Connecting-Rods for Electric Locomotives.) Joseph Bianchi. Rev. Gen. Feb., '23.
- 7. Use of Electricity**
- Railway Electrification.* Arthur L. Mudge. Eng. Inst. Can. Mar., '23.
- All-Electric Passenger Service for New Haven.* W. J. Clardy. Ry. Age Mar. 17, '23.
- Contrôle des Consommations d'Electricité des Gares, Depots, etc. par les Consommations Normales.* (Control of the Consumption of Electricity in Stations, Freight Houses, etc., by the Normal Consumptions.) Th. Gerault. Rev. Gen. Feb., '23.
- Die Wirtschaftlichkeits-Aussichten der Elektrifizierung der schweizerischen Eisenbahnen vor zehn Jahren und heute.* (The Economic Prospects of the Electrification of the Swiss Railroads Ten Years Ago and Today.) W. Kummer. Schw. Bauz. Feb. 3, '23.
- 8. Stations. Engine Houses. Shops**
- Reinforced Concrete Coaling Plant at Michigan City, Ind.* Ry. Rev. Feb. 3, '23.
- Freight Facilities in the Proposed Terminal, Chicago.* Ry. Rev. Feb. 3, '23.
- Traveling Crane Has Turntable to Swing Locomotives.* Eng. N. R. Feb. 8, '23.
- M. K. & T. Builds New Terminal at Denison.* Ry. Age Feb. 17, '23.
- Proposed State St. Terminal Station at Chicago.* Eng. N. R. Feb. 22, '23.
- Der neue Bahnhof in Stuttgart.* (The New Railroad Station at Stuttgart.) Martin Mayer. Z. d. Bauver. Jan. 24, '23.

b. Special Railroads

- 1. Rack Railroads**
- Railroad Building in the Andes.* Leonard Matters. Sci. Am. Feb., '23.
- 3. Narrow Gauge. Light Railways**
- Feeder Railways of 24-In. Gauge in Argentina.* Eng. N. R. Feb. 15, '23.

d. Street Railways, Elevated Railways, Subways

- 4. Track**
- Conference on "Design and Construction of Streets for Street Railway Traffic". Engrs. & Eng. Feb., '23.
- 5. Rolling Stock**
- L'Exploitation des Chemins de Fer d'Intérêt Local par Automotrices à Moteurs à Explosion.* (Operation of Local Railroads by Motor Cars with Explosion Engines.) Pierre Jacquinet. Gen. Civ. Jan. 27, '23.

c. Automobiles

2. Internal Combustion Engine Automobiles

Les Camions a Gas Pauvre. Le Concours de Véhicules à Gazogène de l'Automobile-Club de France (Juillet, 1922).* (The Gas Producer Vehicle Competition of the French Automobile Club (July, 1922).) Ch. Dantin. Gen. Civ. Serial beginning Feb. 3, '23.
 Das "Klopfen" der Fahrzeug-Verbrennungsmaschinen.* (The "Knocking" of Aviation Combustion Engines.) A. Heller. Ver. deu. Ing. Feb. 17, '23.

f. Aeronautics

1. General Articles

Schlachtschiff, Unterseeboot, Luftfahrzeug. (Battleship, Submarine, Airship.) W. Laudahn. Ver. deu. Ing. Serial beginning Feb. 10, '23.

4. Aerodromes and Landing Fields

Air Terminals.* Archibald Black. Engrs. & Eng. Feb., '23.
 Aircraft Terminals and the Safety Code.* Arthur Halsted. Engrs. & Eng. Feb., '23.
 Huge Airship Hangar for U. S. Army: Scott Field, Illinois.* Hilmar F. Smith. Eng. N. R. Feb. 22, '23.

I. Municipal Water-Works. Agricultural Engineering

a. General Articles

The Apulian Aqueduct—Southern Italy's Water Supply.* I. Gutmann. Eng. N. R. Mar. 1, '23.
 Irrigation in Australia.* P. J. Risdon. Sci. Am. Apr., '23.

b. Hydrology. Water Resources

Vaal River Water Supply Development.* W. Ingham. Eng. & Contr. Jan. 31, '23.
 Features of New Well Water Supply at Memphis, Tenn. J. R. McClintock. Mun. & Co. Eng. Feb., '23.
 Doubling New York's Water Supply.* Sci. Am. Feb., '23.
 Development of Well Water Supplies. John W. Toyne. (Abstract of paper read before Indiana Sanitary and Water Supply Assoc.) Eng. & Contr. Mar. 14, '23.
 Bombay Water Supply.* Engr. Serial beginning Mar. 16, '23.
 Die Bewegungsgesetze und die Mengenbestimmung des Grundwassers.* (The Law of Movement and the Determination of the Amount of Subterranean Waters.) Hermann Koschmieder. Gesund. Ing. Feb. 3, '23.
 Die Berechnung der Spiegelabsenkung bei der Entnahme von Grundwasser und die Ergiebigkeit der Fassungsanlagen.* (Calculation of the Lowering of the Water-Table by the Taking of Underground Water and the Productivity of Such Plants.) Hermann Koschmieder. Gesund. Ing. Feb. 17, '23.

c. Dams and Reservoirs

Digging from Below, Up.* (A Dam-Construction Problem.) J. F. Springer. Sci. Am. Mar., '23.
 Percolation Through and Hydraulic Pressure Under Earth Dams. A. L. Fellows. Eng. N. R. Mar. 1, '23.

d. Analysis and Purification of Water

Tastes and Odors in Public Water Supplies from Decomposing Organic Matter.* F. H. Waring. Am. W. W. Assoc. Jan., '23.
 Twenty Years of Filtration Practice at Albany.* George E. Willcomb. Am. W. W. Assoc. Jan., '23.
 The Disinfection of Public Water Supplies and Its Relation to Public Health. C. A. Jennings. Am. W. W. Assoc. Jan., '23.
 Purification of Water for Industrial Use.* Sheppard T. Powell. Am. W. W. Assoc. Jan., '23.
 Effect of Water Containing Sulphates on Concrete. (From *Concrete and Constructional Engineering*.) Eng. & Contr. Jan. 31, '23.
 Experiments on Formation of Flocc for Sedimentation.* Edward S. Hopkins. Eng. N. R. Feb. 1, '23.
 General Aspects of Water Softening.* Charles P. Hoover. (Paper read before Indiana Sanitary and Water Supply Assoc.) Eng. & Contr. Mar. 14, '23.
 Das Abwasserklärverfahren nach System Westen. (The Process of Sewage Clarification by the Westen System.) Schmetzner. Gesund. Ing. Feb. 17, '23.

e. Distribution of Water

Air and Water Relief Valves. M. M. Borden. Am. W. W. Assoc. Jan., '23.
 Report of Committee on Physical Standards for Distribution Systems. Am. W. W. Assoc. Jan., '23.
 Precast Concrete Flume on Klamath Project.* E. C. Koppen. Eng. N. R. Feb. 1, '23.
 Water Measurements on Irrigation Project.* C. C. Cragin. (From *Reclamation Record*.) Eng. & Contr. Feb. 14, '23.
 Discharge Through Adjustable Submerged Orifices.* H. A. Wadsworth. Eng. N. R. Feb. 15, '23.
 Pumping Assists Reclamation of Alkali Lands. W. W. Weir. (From paper read before National Drainage Cong.) Eng. N. R. Feb. 22, '23.
 Abnormal Friction Losses in a 12-inch Water Main.* James Purves. Eng. Inst. Can. Mar., '23.
 Die Betriebswasserversorgung der Laurahüttegrube in Laurahütte (Oberschlesien).* (The Plant Water Supply of the Laurahütte Mine at Laurahütte—Upper Silesia.) Hermann Kratz. Ver. deu. Ing. Feb. 3, '23.

Chicago Water Works and Effect of Meters.* L. R. Howson. (Paper read before Indiana Sanitary and Water Supply Assoc.) Eng. & Contr. Mar. 14, '23.

f. Drainage of Land

Land Reclamation by Sand Pumping.* Gascoigne Lumley. Eng. & Contr. Jan. 31, '23.
Method and Costs of Cleaning Open Drains with Drag Line Excavator.* Eng. & Contr. Feb. 14, '23.
Drainage Project on the Columbia Adjoining Portland, Ore.* W. P. Hardesty. Eng. N. R. Mar. 1, '23.
Drainage of Farm Lands. A. E. Farncomb. (Paper read before Alberta Land Surveyors.) Can. Engr. Mar. 20, '23.

x. Miscellaneous

Water Works Accounting at Herkimer, New York.* Arthur T. Clark. Am. W. W. Assoc. Jan., '23.

J. Sewerage. Sewage and Refuse Disposal

a. Sewers and Drains

Water Infiltration in Sewer Systems. H. V. Pederson. (Paper read before Iowa Eng. Soc.) Feb., '23.
Making Sewer Joints with the Pipe Partly Under Water.* L. B. Reynolds. Eng. N. R. Feb. 22, '23.
Converting Columbia Slough Into Sewage Outlet.* W. P. Hardesty. Eng. N. R. Mar. 1, '23.
Curing a "Sick" Sewer System.* Leon B. Reynolds. Eng. & Contr. Mar. 14, '23.
Die Wirkung von Regenüberfallbauwerken städtischer Kanalsationen auf der Vorfluter.* (The Effect of Rainfall Waste Structures in Sewers, on the Flow Lines.) Hermann Kurz. Gesund. Ing. Serial beginning Feb. 17, '23.

b. Sewage Disposal. Purification

Activated Sludge System at Bradford. Joseph Garfield. (From *The Surveyor*.) Eng. & Contr. Jan. 31, '23.
The Present Status of Sewage Treatment in England.* George W. Fuller. Eng. N. R. Serial beginning Feb. 1, '23.
Fixation of Atmospheric Nitrogen by Activated Sludge.* C. Lee Peck. Eng. N. R. Mar. 15, '23.
Garbage Incinerator at Chatham, Ont.* Can. Engr. Mar. 20, '23.

c. Refuse Disposal

Collection and Disposal of Municipal Refuse.* Earl L. Waterman. (Paper read before Iowa Eng. Soc.) Eng. & Contr. Feb. 14, '23.

K. Heat Engines.

a. Steam Engines. Boilers

New Means of Ascertaining Mean Pressure in a Heat Engine.* H. E. Wimperis. Engr. Mar. 2, '23.

b. Steam Turbines

Metropolitan-Vickers Rateau Marine Turbine.* H. L. Guy and P. L. Jones. (Paper read before Soc. of Naval Architects of Japan.) Eng. Serial beginning Feb. 9, '23.

c. Gas and Oil Engines

Utilization of Heavy Fuel Oils in Internal Combustion Engines.* Harold E. Moore. Engr. Feb. 2, '23.
The Evolution of the Heavy Oil Engine.* R. E. Mathot. (Trans. from paper read before Int. Cong. on Liquid Fuel.) Engr. Feb. 9, '23.
A Practical Way to Detect Afterburning in Oil Engines.* H. F. Shepherd. Power Feb. 13, '23.
Betriebsversuche an einer Gasgebläsemaschine.* (Operating Test on a Gas Blowing Engine.) Marcel Steffes. Ver. deu. Ing. Feb. 17, '23.
Kompressorlose Oelmaschinen.* (Compressorless Oil Engines.) F. P. Grützner. Ver. deu. Ing. Jan. 20, '23.

L. Electricity

b. Distribution and Transmission of Electricity

1. Power Plants

The Nechells Power Station of the Birmingham Corporation.* W. Noble Twelvetrees. Eng. Serial beginning Jan. 26, '23.
Central Heat and Power Plant for Group of Office Buildings.* George C. Stierhoff. Power Feb. 27, '23.
The Cost of Industrial Power.* J. A. Burnett. Eng. Inst. Can. Serial beginning Mar., '23.
The Central Electric Generating Station at Comines.* Engr. Serial beginning Mar. 9, '23.
2. Long-Distance Transmission of Energy
A New Method for the Routine Testing of Alternating-Current High-Voltage Paper-Insulated Cable.* Howard S. Phelps and E. Dean Tanzer. A. I. E. E. Mar., '23.

e. Electro-chemistry and Electrometallurgy

L'Extraction Electrolytique du Cuivre par le Procédé Greenawalt.* (Electrolytic Extraction of Copper by the Greenawalt Process.) Gen. Civ. Jan. 27, '23.

f. Signals and Communication

The Marconi Transatlantic Wireless Stations at Carnarvon and Towyn.* Eng. Serial beginning Feb. 2, '23.

The Wireless Equipment of Aircraft.* Engr. Feb. 23, '23.

A Diaphragmless Microphone for Radio Broadcasting.* Phillips Thomas. A. I. E. E. Mar., '23.

M. Architecture**a. Educational, Government and Scientific Buildings**

Wettbewerb für ein städtisches Gymnasium auf dem Kirchenfeld in Bern.* (Competition for a Municipal Gymnasium on the Kirchenfeld in Bern.) Schw. Bauz. Serial beginning Feb. 24, '23.

c. Residences, Hotels

Improvements in the Sanitary Appliances and Fittings for New Housing Schemes, Having Regard to Efficiency and Economy.* Harvey R. Sayer. Inst. Mun. & Co. Engrs. Jan. 30, '23.

A Survey of the National Housing Scheme, 1919-22. Arthur Race. Inst. Mun. & Co. Engrs. Feb. 27, '23.

More Houses for Less Money.* Harold Cary. Sci. Am. Mar., '23.

f. Factories and Mill Buildings

Les Nouveaux Abattoirs de Casablanca (Maroc).* (The New Slaughter-Houses at Casablanca (Morocco).) L. Benoist. Gen. Civ. Feb. 3, '23.

g. Other Buildings

Special Structural Features of San Francisco Theatre.* Zara Witkin. Eng. N. R. Feb. 1, '23.

Chicago Building Huge Public Stadium on Lake Front.* Eng. N. R. Feb. 15, '23.

Six Stages in One.* Sci. Am. Mar., '23.

Erection of the Washington Monument.* D. L. Weart. Mil. Engr. Mar.-Apr., '23.

h. Roofs, Domes

Reinforcing a Wooden Roof Frame Five Centuries Old.* Eng. N. R. Mar. 15, '23.

Couverture en Béton Armé, avec Porte à Faux de 40 Mètres, pour Grandes Tribunes.* (Reinforced Concrete Roof with a 40-Meter Overhang, for Large Galleries.) Gen. Civ. Feb. 24, '23.

x. Miscellaneous

Künstlerische Lehren aus dem Wiederaufbau in Ostpreussen.* (Artistic Teachings from the Reconstruction in East Prussia.) O. Jürgens. Z. d. Bauver. Jan. 31, '23.

Die neuen Regungen des Hamburger Backsteinbaus in der Mitte des 19 Jahrhunderts.* (The New Movement of the Hamburg Brick Architecture in the Middle of the 19th Century.) Fritz Schumacher. Z. d. Bauver. Serial beginning Feb. 7, '23.

N. Landscape Engineering. City Planning

Plan for the Lay-Out of a Garden Suburb.* Chas. T. Read. Inst. Mun. & Co. Engrs. Jan. 30, '23.

Street Intersections Mapped Out by Means of Contours.* F. S. Besson. Eng. N. R. Feb. 8, '23.

Automobile Control, City Planning and Traffic Regulation. Herbert S. Swan. Eng. N. R. Feb. 22, '23.

Regional Planning.* Nelson P. Lewis. Engrs. & Eng. Mar., '23.

Bognor Pavillion Gardens Scheme.* Oswald A. Bridges. Inst. Mun. & Co. Engrs. Mar. 13, '23.

The Street System of a Modern City.* F. S. Besson. Mil. Engr. Mar.-Apr., '23.

Die Ausgestaltung des inneren und äusseren Rayons der Stadt Köln.* (The Planning of the Inner and Outer Belts of the City of Cologne.) Fritz Schumacher. Ver. deu. Ing. Feb. 17, '23.

O. Administration. Legislation. Economics. Statistics**b. Economic Question of a General Character; Valuations, etc.**

La Situation Economique de l'Allemagne avant et près la Guerre.* (The German Economic Situation Before and After the War.) Gen. Civ. Jan. 27, '23.

d. Administrative and Financial Management of Means of Communication

L'Exploitation des Transports en Commun de la Région Parisienne dans ses Rapports avec le Public.* (Joint Operation of Transportation Lines in the Parisian Region in its Relations to the Public.) R. Lee More. Gen. Civ. Jan. 20, '23.

e. Legislation—Question Concerning Wages and Working Conditions

La Journée de Huit Heures et sa Répercussion sur la Production. (The Eight-Hour Day and its Reaction on Production.) Henri Ponçay. Gen. Civ. Serial beginning Feb. 10, '23.

g. Engineering Education

The Writing of Engineering Reports. Nathan C. Grover. Cornell C. E. Mar., '23.

Q. Surveying and Geodesy

Surveying Without Instruments on Siberian Railway.* William Ewald. Eng. N. R. Feb. 1, '23.

Application of Aerial Photographs to Map Making.* Douglas H. Nelles. Can. Engr. Mar. 13, '23.

Vermessungswesen und Kartographie in Spanien. (Surveying Methods and Cartography in Spain.) Franz Manek. Oest. Ing. Arch. Ver. Feb. 9, '23.